DeSmet-Tensed Trail Project

Special Provisions & Technical Specifications

Project Control Schedule Numbers: BIA P05097 & IDOT A009(752)

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Plummer, Idaho 83851

Engineer:
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TerraGraphics
Environmental Engineering, Inc.
AND ASSOCIATED FIRMS

Project Location:
Benewah County, DeSmet/Tensed, Idaho

June 25, 2009

PROFESSIONAL ENGINEER
REGISTERED
12175
6-25-2009
STATE OF IDAHO
DEREK FORSETH

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SP 1 – PROJECT DESCRIPTION

The project includes construction of a new paved trail to connect the towns of DeSmet and Tensed, Idaho to provide a safe route for non-motorized travel between the two communities. The trail will be a 9-foot wide asphalt-paved trail and gravel shoulder installed at-grade within a 20-foot wide easement. A 100-foot span pre-fabricated steel bridge will be installed across Hangman Creek at the north end of the trail alignment. The trail will generally run in a north-south direction parallel to Highway 95.

The Contractor shall prepare and submit a Stormwater Pollution and Prevention Plan for the project. A general plan is provided in the Drawing set. The general plan was prepared for bidding purposes to identify the general types of work and the types of Best Management Practices (BMPs) anticipated.

The Contractor shall prepare and submit a MUTCD Traffic Control Plan (TCP) for the project. A general TCP is provided in the Drawing set. The general plan was prepared for bidding purposes to identify the general types of work and the type of TCP anticipated.

The Contractor shall provide final design of the pre-fabricated steel bridge and bearing system.

The Engineer will stake the work. This includes establishing the horizontal and vertical alignment of the trail, culvert locations, and bridge locations.

SP 2 – INSPECTION OF SITE AND PRE-CONSTRUCTION CONFERENCE

The contractor shall be satisfied as to the construction conditions by personal examination of the Project Site and any other examination and investigation that the Contractor may desire to make as to the nature of the construction and the difficulties to be encountered. Contractor shall promptly report <u>in writing to the Owner any conflict, error or discrepancy that the Contractor may discover and shall obtain a written interpretation from the Owner before proceeding with the work.</u>

The contractor shall attend a pre-construction conference with the Owner and other attendees as requested by the Owner prior to starting work.

SP 01000 – TRAIL CONSTRUCTION

1. GENERAL

A. This specification section covers the work necessary to install approximately 3012 LF of 9’ wide asphalt paved trail. This will include excavation, haul, and disposal of native material, sub-grade preparation, placement of geotextile, placement and compaction of sub-base, placement and compaction of base-coarse, asphalt pavement surface coarse, and all associated work. The trail cross section consists of asphalt

pavement over an aggregate base that is underlain by a geotextile fabric as shown on the Drawings.

B. Items which are not explicitly covered in these written specifications but are required to make a functioning installation shall not be misconstrued by the contractor as not being a part of the scope of work covered by the contract. Those items which are not specifically covered in these specifications, but are required to make a functioning installation, shall be constructed in accordance with the construction industry's highest standards.

C. Contractor shall arrange for and conduct all testing that is required as specified herein directly or by reference. There shall be no separate pay item for testing that is required by the specifications.

1.1 RELATED SECTIONS

SP 1400 – Trailside Amenities
Section 01501 – Site Control

1.2 SUBMITTALS FOR REVIEW

A. Subgrade compaction test results per ITD Specification Section 205.

B. Geotextile product information including manufacturer, full product name, certification of compliance with specifications.

C. Gradation and sand equivalent test results for all aggregate materials in accordance with ITD Special Provision S637.

D. Plant mix pavement quality control test results indicating gradation and asphalt content per ITD Special Provision S637.

1.3 MEASUREMENT AND PAYMENT

A. Payment will be made on a unit price basis as bid by the Contractor. The price bid includes furnishing all labor, equipment and materials necessary for completing the work in place as specified in the design drawings.

B. The pay unit for Trail Construction will be Lineal Foot (LF) as measured along the center line of the paved trail. The length of the bridge will not be included in the total length for Trail Construction.

C. Pay Items:

Pay Item	Description	Pay Unit
01000.01	9' wide AC pavement surface trail construction	LF

1.4 QUALITY CONTROL

A. Obtain Owner approval of the subgrade prior to placing geotextile.
B. Compact and test subgrade per ITD Specification Section 205 Excavation and Embankment.
C. Owner will be present to observe compaction testing.
D. Obtain Owner approval of the aggregate base prior to paving.
E. Quality control test of aggregate base material shall be per ITD Special Provision S637 (included in Appendix B).
F. Qualtiy control test of asphalt pavement shall be per ITD Special Provision S637 (included in Appendix B).

2. PRODUCTS

A. Geotextile
   a. Type II Subgrade Separation Geotextile as defined by the Idaho Standards for Public Works Construction- Section 2050 – Construction Geotextiles.
   b. Material shall be a non-woven fabric meeting the following minimum requirements:

Geotextile Property	Test Method	Minimum Requirement
Grab Tensile Strength (lb)	ASTM D 4632	180
Grab Elongation (%)	ASTM D 4632	>50%
Puncture Strength (lb)	ASTM D 4833	70
Trapezoidal Tear Strength (lb)	ASTM D 4533	70
Apparent Opening Size (Standard Sieve)	ASTM D 4751	#30
Permittivity (1/sec)	ASTM D 4491	0.02

B. Sub Base
   a. Sub Base shall be a 1½" minus crushed aggregate meeting the following gradation:

Percent passing by weight	
Passing	1 ½" Minus
2" Sieve	-
1 1/2" Sieve	100%
1" Sieve	-
3/4" Sieve	55-80%
3/8" Sieve	-
No. 4 Sieve	25-60%
No. 10 Sieve	-
No. 200 Sieve	0-8%

b. Material shall consist only of angular crushed rock. Larger particles shall be free of rounded material and fines should be free of soil.

C. Base Course

a. Base Course shall be a ¾" minus crushed aggregate meeting the following gradation:

Percent passing by weight	
Passing	3/4" Minus
2" Sieve	-
1 1/2" Sieve	-
1" Sieve	-
3/4" Sieve	100%
3/8" Sieve	-
No. 4 Sieve	40-65%
No. 8 Sieve	30-50%
No. 200 Sieve	3-9%

b. Material shall consist only of angular crushed rock. Larger particles shall be free of rounded material and fines should be free of soil.

D. AC Pavement Trail Surface

a. Hot Plant Mix Asphaltic Concrete as specified in Idaho Transportation Department (ITD) Special Provision S637 (included in Appendix B).

3. EXECUTION

A. Layout

a. All survey work required establishing locations, alignments, and grades will be performed by the Owner's representative.
b. Refer to design drawings for location and installation details for the trail.

B. Clearing

a. Existing vegetation shall be cleared flush with the ground along the trail alignment to a width of 12 feet.
b. Cleared material and debris shall be disposed of off site unless otherwise approved by the Owner. Contractor shall coordinate disposal location with the Owner.

C. Topsoil Excavation and Disposal

a. Topsoil shall be excavated as necessary and compacted to install a minimum finished trail depth of 12 inches for a width of 12 feet except where otherwise noted on the design drawings. Finished trail shall be flush with adjacent grades as shown on the Detail Drawings.

b. Excavated topsoil shall be disposed of off site or at a location approved by the Owner.

D. Subgrade Preparation

a. Subgrade shall be cleared of large rocks, sticks, or other debris that may puncture the geotextile.
b. Compact subgrade per ITD Specification Section 205 “Class B” Compaction. Contractor may use additives such as fly ash, hydrated lime, or Portland cement as required depending on the time of construction. Any additives deemed necessary by the contractor to provide a suitable subgrade shall be applied as recommended by the manufacturer.
c. Submit compaction test results to owner and notify owner prior to placing geotextile.

E. Geotextile

a. Install fabric between compacted subgrade and crushed aggregate base course across the entire width of the trail and a minimum of six inches (6”) vertically along the edge of the trail base for excavated sections. For fill sections, the geotextile should be installed to the toe of the fill at each edge of the trail.
b. Geotextile shall be installed in a manner consistent with the manufacturer’s recommendations.
c. Construction vehicles shall not drive directly on the geotextile material.

F. Sub Base

a. Place 1 ½” minus Sub Base material in continuous horizontal lifts over the geotextile to form a minimum compacted thickness of six inches (6”).
b. Blade the surface to remove irregularities and produce a smooth, even surface prior to compaction.
c. Moisten or dry the aggregate to a uniform moisture content suitable for compaction.
d. Compact material using any reasonable means as determined by the contractor.
e. Compact per ITD Special Provision S637 to 95 percent of the standard density.
f. Submit test results to owner and notify owner prior to placing base course.

G. Base Course

a. Place ¾” minus Base Course material in continuous horizontal lifts over the Base Course to a minimum compacted thickness of three inches (3”).
b. Ensure that coarse aggregates and fine aggregates are well mixed.

c. Moisten or dry the aggregate to a uniform moisture content suitable for compaction.
d. Compact material using any reasonable means as determined by the contractor.
e. Compact per ITD Special Provision S637 to 95 percent of the standard density.
f. Submit test results to owner and notify owner prior to paving.

H. AC Pavement Trail Surface
a. Install Hot Plant Mix Asphaltic Concrete per ITD Special Provision S637.
b. Place to minimum thickness of three inches (3”) and a finished tread width of nine feet (9’) as shown on the plans
c. Final trail surface should be level with existing grade except where otherwise noted on the design drawings.

I. Finish Grading and Site Restoration
a. Place 3” of ¾” minus Base Course material between edge of pavement and clearing limits to form a gravel shoulder along the edge of the trail.
b. Blend gravel to match existing grade
c. Restore any displaced material within the trail right-of-way from construction activities or equipment access and blend with existing ground.

END OF SECTION – TRAIL INSTALLATION

SP 01100 – CULVERT INSTALLATION

1. GENERAL

A. This specification section covers the work necessary to install culverts under the trail surface at approximate stations 2+35, 4+74, 26+58 and 31+04, and in the City of Tensed public right-of-way.

B. Items which are not explicitly covered in these written specifications but are required to make a functioning installation shall not be misconstrued by the contractor as not being a part of the scope of work covered by the contract. Those items which are not specifically covered in these specifications, but are required to make a functioning installation, shall be constructed in accordance with the construction industry's highest standards.

1.1 RELATED SECTIONS

SP 01000 – Trail Construction
Section 01501 – Site Control

1.2 SUBMITTALS FOR REVIEW

A. Submit manufacturer's certification that pipe meets or exceeds specified requirements

1.3 MEASUREMENT AND PAYMENT

A. Payment will be made on a unit price basis as bid by the Contractor. The price bid includes furnishing all labor, equipment and materials necessary for completing the work in place as specified in the design drawings.

B. The pay unit for Culvert Installation will be by the foot complete in place, Riprap headwalls shall be considered incidental and no separate pay item shall be provided for riprap headwalls.

C. Pay Items:

Pay Item	Description	Pay Unit
01100.01	12" Diameter RCP	LF
01100.02	18" Diameter RCP	LF

1.4 QUALITY CONTROL

A. Owner shall review culvert installations prior to installing trail cover.

B. Contractor shall protect culverts during installation of trail including compaction.

2. PRODUCTS

A. The Contractor shall supply culverts and all materials, labor, equipment, tools and items required for installation as shown on the design drawings and details listed below.

B. The culverts shall be reinforced concrete pipe (RCP) per ITD Section 706.04, Minimum concrete strength shall be 6,000 psi. The pipe diameter shall be twelve inches (12") or eighteen inches (18") as indicated in the design drawings. Minimum wall thickness shall be as required by ITD Section 706.04.

C. Pipe bedding and backfill material shall be 1 ½" minus crushed aggregate. The gradation requirements for this material are the same as the sub-base material described under SP 01000 – "Trail Construction."

D. Riprap shall be used for culvert headwalls where indicated on the design drawings. Material shall be dense, hard, sound, angular, close-grained quarry stone free from overburden material that will not slake or deteriorate on exposure to the action of water or atmosphere. Gradation for Rip Rap is described as follows:

Sieve Size	Percent Passing
12"	100%
8"	70-100%
6"	30-70%
4" Minus	0-30%

E. Geotextile

a. Type II Subgrade Separation Geotextile as defined by the Idaho Standards for Public Works Construction- Section 2050 – Construction Geotextiles.

b. Material shall be non-woven, and must meet the same requirements as the geotextile described under SP 01000- "Trail Construction."

3. EXECUTION

A. Refer to design drawings for location and installation details of culverts.

B. Excavation shall be wide enough to accommodate the full width of the structure and compaction equipment on both sides.

C. Depth of excavation shall be sufficient such that all soft, unsuitable, or unstable material is removed. Subgrade shall be compacted to form a stable subgrade at least 6” below the culvert bottom prior to installing fabric.

D. Fabric layer will be installed between native material and bedding material.

E. Culvert should be installed to match the existing grades at upstream and downstream ends.

F. Backfill must be replaced symmetrically on each side of the structure in 6” maximum loose lifts. Each lift is to be compacted to form a firm, stable base that does not yield when trail compaction is conducted.

G. All fill material above the culvert shall be placed in 6” maximum loose lifts and shall be compacted to form a firm, stable base that does not yield when trail is compacted.

H. Finished trail surface grade shall provide a minimum of six inches (6”) of cover material above the culvert structure.

I. Local fill material must be structural material suitable for stable backfill. May be found or excavated on-site as approved by the Owner. Material may not include wood, organics, rocks bigger than 6” or more than 12% fines.

END OF SECTION – CULVERT INSTALLATION

SP 01200 – PREFABRICATED BRIDGE & BEARING SYSTEM

1. GENERAL

A. This specification section covers the work necessary to design, fabricate, deliver, and install a prefabricated steel bridge and pile supported bearing structures, connections and associated appurtenances from approximately Station 11+50 to 12+50. Construct the length, width, and capacity of the structure as indicated herein.

B. Furnish and install a prefabricated steel bridge to provide a complete structure ready for use. Items which are not explicitly covered in these written specifications but are required to make a functioning installation shall not be misconstrued by the contractor as not being a part of the scope of work covered by the contract. Those items which are not specifically covered in these specifications, but are required to make a functioning installation, shall be constructed in accordance with the construction industry's highest standards.

C. The BEARING SYSTEM shall include the helical piles, caps, grade beam, bracket assembly and all components apart from the bridge. Contractor shall provide final bearing system design as part of the bridge submittal. A geotechnical report which includes results from a helical pile test installation is available to the Contractor.

D. A geotechnical report has been prepared by STRATA for this project and is available from the Owner. This report shall be used by the Contractor as a guide for this work.

E. The Contractor is responsible for laying out pier installation locations and coordinating with the final bridge and bearing assembly.

1.1 RELATED SECTIONS

Section 01501 – Site Control

1.2 QUALITY CONTROL

A. Prefabricated Bridge

1. Provide 2 week notice to Owner prior to delivery and/or installation of bridge.
2. If prefabricated structure is not installed immediately upon delivery to the site, support and stack all components to prevent damage.
3. Bridge fabricator shall be certified by the American Institute of Steel Construction to have the personnel, organization, experience,

capability to produce fabricated structural steel for Conventional Steel Structures and Major Steel Bridge Structures.

4. Bridge shall be inspected by a Certified Weld Inspector (CWI) that is qualified under the AWS QC-1 program. Inspection shall include as a minimum review of shop drawings, weld procedures, welder qualifications and weld testing reports, visual inspection of welds and verification of overall dimensions and geometry of the bridge.

B. Helical Piers

1. Helical Piers, Anchors, and Bracket Assemblies shall be installed by Contractor experienced in the installation of helical piers.

2. Contractor shall notify Owner two (2) weeks prior to installing helical piers and caps.

1.3 MEASUREMENT AND PAYMENT

A. Payment will be made on a unit price basis as bid by the Contractor. The price bid includes furnishing all labor, equipment and materials necessary for furnishing and installing the prefabricated bridge and bearing system and completing the work as specified.

B. The pay unit for Prefabricated Steel Bridge shall be Lump Sum (LS).

C. The pay unit for Bearing System shall be Lump Sum (LS)

D. Pay Items:

Pay Item	Description	Pay Unit
01200.01	Prefabricated Steel Bridge	LS
01200.02	Bearing System	LS
01200.03	Structural Fill	CY

1.4 SUBMITTALS FOR REVIEW

A. Contractor shall submit manufacturer information and bridge details for approval prior to ordering bridge. Include plan, elevation, and section views of the bridge, dimensions of all components, welding and connection details, and general and specific notes regarding design considerations. Contractor shall submit a design that includes drawings that bear the seal of a Professional Engineer licensed in the State of Idaho.

B. Submit certification showing the selected bridge meets or exceeds specified requirements.

C. Certification of structural steel, fasteners, and hardware.

D. A complete list of all bridge components, hardware, and fasteners.

E. Steel fabricator certification that steel fabrication and quality control meet the requirements of the AISC Code of Standard Practice; and that all welding meets the requirements of ANSI/AASHTO/AWS D 1.5 Bridge Welding Code.

F. Complete erection instructions and drawings. Maintain copy at the job site.

G. Bridge manufacturer's written inspection and maintenance procedures to be followed by the Owner.

H. List of similar helical pile installations for Contractor installing the piles and evidence of training in helical pile installation and testing.

I. Helical Pier shop drawings showing product design and basic configuration for planned installation including materials, coatings, and bracket assemblies.

J. Grade beam details as part of the proposed bridge design and shop drawings.

K. Concrete mix design data and supporting test documentation.

L. Concrete product data including admixtures and curing compounds.

M. Gradation sheets for course and fine aggregates used in concrete.

N. Concrete test results per ISPWC Section 703.3.6

2. PRODUCTS

A. The Contractor shall furnish and install bridge and required materials, labor, equipment, tools and items for installation of bridge, abutments, and foundation systems.

B. The specification is intended to establish the type, function, appearance, and quality required. Manufactures other than Roscoe may be used provided they are pre-approved by the Owner and they meet or exceed all the specifications herein.

C. Structural Backfill shall be a 1 ½" minus crushed aggregate meeting the same requirements as the Sub-Base Material as described is Section SP-1000.

2.1 PREFABRICATED STEEL TRUSS TRAIL BRIDGE

A. Bridge shall be Roscoe Pony Truss prefabricated steel truss trail bridge, or approved equal with the following configuration:
   1. Span: One hundred feet (100') clear span
   2. Width: Nine feet (9') wide travel way from inside of truss to inside of truss.
   3. Decking: Number two Douglas Fir decking, 4" nominal thickness, treated.
   4. Fifty four inches (54") high safety rail.
   5. Standard end to end camber of two percent (2%).

B. DESIGN
   1. Bridge shall be designed by a professional engineer licensed in the State of IDAHO experienced in bridge design.
   2. Design shall conform with AASHTO Guide Specifications for Design of Pedestrian Bridges, August 1997.
   3. Pedestrian Live Load Rating: per AASHTO reduction formula for 900 sf deck area.
   4. Vehicle Load: None required. Bollards will be placed at each end of the bridge to prevent vehicle access.
   5. Wind Loads: 30 psf. Calculated on the entire vertical surface of the bridge as if fully enclosed.
   6. Design Criteria: Design shall be in accordance with American Institute of Steel Construction latest edition.
   7. Seismic: Per local code.
   8. Temperature: Bridge shall be designed to accommodate a temperature differential of 120 degrees Fahrenheit. Slip pads of UHMW polyethylene shall be paced between the smooth surface of the setting plate and the smooth bearing plate of the bridge.
   9. Deflection: The vertical deflection of the bridge due to pedestrian live load shall not exceed 1/500 of the length of the span.

C. MATERIALS

   1. Unpainted weathering steel. Fabricated from ASTM A242 or ASTM A588 steel for plates and structural shapes and ASTM A606 or ASTM A847 for tubular sections.

   2. Wood Decking shall be treated No 2. Douglas Fir. Decking shall be attached with at least two fasteners where planks cross supporting members as recommended by bridge manufacturer.

3. Field splices shall be bolted as recommended by bridge manufacturer.

4. Welding materials shall be in accordance with American Welding Society (AWS). Welders shall be certified in accordance with AWS.

2.2 HELICAL PIERS

A. Helical piers shall be ICC listed. Contractor shall furnish evidence to the Owner by means of the ICC evaluation report number ER-5110.

B. Basis of design product shall be SS-5-Type helical piers as manufactured by A.B. Chance, 2010 North Allen Street, Centralia MO 65240 or a comparable product (approved equal).

C. The Contractor shall select the appropriate size and type of helical pier and bracket assemblies to support the allowable loads. These specifications and the drawings provide minimum requirements to aid the Contractor in making appropriate materials selections. The Contractor shall provide structural design with individual pier capacities on the bearing system with a factor of safety equal to at least 3.0 on the ultimate axial pier capacity for both compression and uplift. Structural design shall consider the span between piers with respect to the grade beam reinforcing and load conditions.

D. Pier to pier cap connections shall be designed by a licensed structural engineer.

E. Piers must be installed with a minimum SS-5, 8-10-12 inch diameter triple-helix configurations.

F. Helical piers shall have a radius of influence of 3 times their diameter or approximately 30 inches from the center shaft.

Piers must extent to a minimum depth of 25 feet, and achieve the axial capacity required by the structural design. It is anticipated piers must be installed to a depth of 50 feet to achieve a 3.0 factor of safety. The test pier installed during the geotechnical investigation extended 50 feet to achieve an ultimate axial capacity of 50 kips. (a)High strength low alloy (HSLA), low to medium carbon steel grade (similar to AISI 1530) with improved strength due to fine grain size and structure having a torsional strength rating of 10,000 ft.-lbs.

Helices shall be a minimum of 8-inch diameter. Helices shall be carbon steel sheet, strip, or plate formed on matching metal dies to true helical shape and shall conform to ASTM A715 Grade 80.

Bolts used to connect the helical pier extensions to lead sections or another extension shall conform to ASTM A193 Grade B7.

Couplings shall be formed as an integral part of shaft extension material through a forging process.

Steel Helical Piers shall be shall extend to sufficient depth to achieve the design operating load and associated required torque by drilling with a minimum down force of 2000 pounds. Pier refusal shall be determined when less than one vertical inch of anchor head movement occurs in 5 minutes of consistent drilling. Continuous torque measurements are required.

G. Helical Bearing Plates: Size and thickness per manufacture recommendation. Minimum thickness of 3/8 inch and meeting ASTM A36.

H. Corrosion Protection: Piers and Bracket assemblies shall be hot-dip galvanized per ASTM A123 or A153. Piers shall be designed to account for potential loss due to corrosion that is associated with an anticipated range of steel loss between 1.0 and 1.5 oz peer square foot per year.

I. Connections: Shall be per manufacturer's recommendation. Bolts shall be zinc coated ASME SAE Grade 8 (heavy duty). All bolts shall be securely tightened. Connections may need to be sleeved per manufacture recommendation.

J. Helical Piers shall be fitted with a manufactured New Construction Bracket Assembly rated for the design allowable loads and tied to the Grade Beam per Bracket manufacture recommendation and as determined by typical ACI pile cap calculations.

2.3 GRADE BEAM

A. The grade beam shown on the plans and described in the specifications provide the minimum sizes and requirements. The Contractor shall verify compatibility of grade beam design with helical pier system and bridge based on final selected manufacture.

B. Length: Shall be Bridge total width plus three (3) feet.

C. Width: As determined by Contractor. 2.5 foot minimum.

D. Height: As determined by Contractor. 2.5 foot minimum.

E. Concrete: Use Class A(AE), f'c = 4000 psi minimum at 28 days with an entrained air content of 5% (+/- 1%). Finish concrete with a rubbed finish.

F. Reinforcing Steel: of the Deformed Type conforming to AASHTO M31 (ASTM A615), Grade 60. Concrete cover per AASHTO. Cut and bend steel in accordance with ACI 315.

G. Bearing Assembly: Contractor shall determine final bearing assembly. Anchor bolts shall be cast into grade beam with a minimum embedment length of 12 inches. Anchor bolts shall be long enough to have 4 inches of thread exposed between the top nut and the end of the bolt after the bridge

is installed to enable shimming in the future. Anchor bolts shall be per bridge manufacturer recommendation. System shall include an elastomeric bearing pad (50 Durometer) sized to match bearing assembly.

H. Concrete formwork shall conform to ISPWC Specification Section 701.

I. Cast-in-place concrete shall conform to ISPWC Specification Section 703 except as described herein.

J. Pre-cast concrete shall conform with ISPWC Specification Section 704.

3. EXECUTION

A. Contractor shall verify all dimensions and coordinate with bridge manufacturer prior to conducting work. Contractor is responsible for verifying abutment location and helical pile installation locations are correct for the bridge prior to construction.

B. Preassemble bearings in the shop and check for proper completeness and geometry. Manufacturer shall clearly mark to identify each bearing component and provide installation details to the contractor.

C. Construct helical piers and grade beam system with anchor bolts. Cast-in-place concrete shall be in accordance with ISPWC Section 703. Pre-cast concrete shall conform with ISPWC Specification Section 704.

D. Helical piers –

i) Advancing Sections:

(1) Engage and advance the Helical Pier sections in a smooth, continuous manner with the rate of pier rotation in the range of 5 to 20 RPM.

(2) Apply sufficient down pressure to uniformly advance the helical sections to approximately 3-inches per revolution. The rate of rotation and magnitude of down pressure must be adjusted for different soil conditions and depths in order to maintain the penetration rate.

ii) Termination Criteria:

(1)The torque as measured during the installation shall not exceed the torsional strength rating of the steel helical lead and extension sections.

(2)The minimum depth criteria of 50 feet must be satisfied prior to terminating the steel Helical Pier due to vertical refusal.

(3)If the torsional strength rating of the pier and/or installing unit has been reached prior to satisfying the minimum depth required, the installing contractor shall have the following options:

(a)Terminate the installation at the depth obtained with the approval of the Engineer of Record and install additional piers at no additional cost to the owner.

(b) remove the pier and attempt to reinstall to beyond the minimum depth criteria.

(4)In the event the minimum installation torque is not achieved at minimum depth, the Contractor shall alter the helix configuration or depth to achieve the required capacity.

(5)The average torque for the last 3 feet of penetration shall be used as a basis of comparison with the minimum recommended installation torque. The average torque is the average of the last three readings recorded at one foot intervals. This average torque is intended solely as an indication of the pier's ultimate compression capacity.

iii) Documentation

The installer shall keep a written installation record for each Helical Pier. This record shall include the following information :

(a)Project name and location.

(b)Name of authorized and certified dealer and installer.

(c)Name of installer's foreman or representative witnessing the installation.

(d)Date of installation.

(e)Location drawing of each Helical Pier.

(f)Description of lead section including number and diameter of helices and
extensions used.

(g)Overall depth of installation from a known reference point.

(h)Installation torque at termination of pier.

E. Native topsoil shall be excavated and removed from area where bridge abutments will be located.

F. Excavate and remove native topsoil to a minimum depth of three feet below the bridge abutment locations. A minimum of three feet of 1-1/2" minus crushed basalt sand and gravel structural fill shall be placed and compacted under the bearing/abutments. Moisture condition structural backfill and place in loose horizontal lifts no thicker than 12 inches and compact using large (10-ton) rollers). Smaller and lighter equipment must use 6 inch maximum lift thickness.

G. Structural backfill must be compacted to 95 percent of the maximum dry density per ASTM D 1557 (Modified Proctor).

H. Compaction of backfill within three (3) feet of abutments shall be performed with vibratory plates and walk-behind compaction equipment until the bridge deck is permanently fixed.

I. Set bearings and components as prescribed by the manufacturer. Adjust in accordance with the manufacturer's instruction to compensate for installation temperature and future movements of the bridge.

J. The Contractor shall install anchor bolts in accordance with the bridge manufacturer's anchor bolt spacing dimensions. Contractor shall provide grounding and lightning protection as recommended by the bridge manufacturer.

K. Contractor shall coordinate with bridge manufacturer for delivery, and unloading of bridge including haul permits. This may include notifying manufacturer of site and soil conditions.

L. Contractor shall obtain information from manufacturer regarding actual lifting weights, attachment points and all necessary information to install the bridge.

M. Furnish and install bridge according to manufacturer's specifications.

4. WARRANTY

Bridge shall be warranted against defects in material and workmanship for a period of ten years from date of delivery.

END OF SECTION – PREFABRICATED BRIDGE

SP 01300 – FILL MATERIAL

1. GENERAL

A. This specification section covers the work necessary to install fill material for bridge approaches, culvert crossings, and other fill sections of the trail. Fill sections are located at approximate Stations 1+24 to 1+45, 2+17 to 2+59, 2+98 to 3+31, 4+60 to 4+78, 11+06 to 11+50, 12+50 to 12+93, 26+42 to 26+58, and 30+73 to 31+14. Fill material will also be required over the culverts installed for farm equipment access north of Hangman Creek.

B. Items which are not explicitly covered in these written specifications but are required to make a functioning installation shall not be misconstrued by the contractor as not being a part of the scope of work covered by the contract. Those items which are not specifically covered in these specifications, but are required to make a functioning installation, shall be constructed in accordance with the construction industry's highest standards.

1.1 RELATED SECTIONS

SP 01000 – Trail Construction
SP 01100 – Culvert Installation
SP 01200 – Bridge Installation
Section 01501 – Site Control

1.2 SUBMITTALS FOR REVIEW

A. Submit manufacturer's information verifying that the selected erosion control blanket meets the design specifications.

1.3 MEASUREMENT AND PAYMENT

A. Payment will be made on a unit price basis as bid by the Contractor. The price bid includes furnishing all labor, equipment and materials necessary for completing the work in place as specified in the design drawings.

B. The pay unit for Fill Material will be Cubic Yard (CY), measured as the volume of Fill Material placed for raised trail sections.

C. Pay Items:

Pay Item	Description	Pay Unit
01300.01	Fill Material	CY
01300.02	Erosion Control Blanket	SY

1.4 QUALITY CONTROL

A. Owner shall verify that Fill Material meets product specifications prior to installation.
B. Obtain Owner approval of fill compaction prior to placing geotextile and trail aggregates.

2. PRODUCTS

A. Fill Material
   a. The material shall be free from peat, wood, roots, bark, debris, garbage, rubbish, or other extraneous material, and shall have a gradation and moisture content such that the specified compaction can be readily attained. The maximum size of stone shall not exceed 6 inches.
   b. If material excavated from the site meets these requirements, it may be used as Fill Material, although no payment will be made for material that is not processed.
B. Erosion Control Blanket
   a. Blanket shall be a fully biodegradable rolled erosion control product made primarily from coconut fiber or similar. Products containing mixed fibers are allowed only if all mulch fiber is certified weed free.

3. EXECUTION

A. Layout
   a. All survey work required establishing locations, alignments, and grades will be performed by the Owner's representative.
   b. Refer to design drawings for location and installation details for the trail.
B. Clearing
   a. Existing vegetation shall be cleared flush with the ground along the trail alignment to the toe of the design fill section. Cleared material and debris shall be disposed of off site unless otherwise approved by the Owner. Contractor shall coordinate disposal location with the Owner.
C. Fill Material
   a. Place Fill Material in continuous lifts with 2:1 (H:V) side slopes to the height indicated in the drawings. Fill Material for culvert headwalls will have a side slope of 1:2 (H:V) or flatter as indicated on the drawings, and be armored with riprap.
   b. Compact Fill Material using any reasonable means as determined by the contractor such as a pneumatic tire roller or vibratory steel drum or

pad roller. Compact material to form a firm base prior to placing the geotextile. Contractor may use additives such as fly ash, hydrated lime, or Portland cement as required depending on the time of construction. Any additives deemed necessary by the contractor to provide a suitable subgrade shall be applied as recommended by the manufacturer.

D. Geotextile
   a. Place separation geotextile to a width of twelve feet (12').
   b. Specifications for geotextile are the same as required in SP 01000 – Trail Construction.
   c. Geotextile shall be installed in a manner consistent with the manufacturer's recommendations.
   d. Construction vehicles shall not drive directly on the geotextile material.

E. Trail Construction
   a. Place Sub Base, Base Course, and AC Pavement Trail Surface over Fill Material and Geotextile as described in SP 01000- Trail Construction

F. Slope Treatment
   a. At brige approach locations: Place Erosion Control Blanket over entire slope per manufacturer's recommended methods.
   b. For culvert cover and other fill: Place and compact 1 ½" Minus base course material over slope as indicated on the Design Drawings.

END OF SECTION – FILL MATERIAL

SP 01400 – TRAILSIDE AMENITIES

1. GENERAL

A. This specification section covers the work necessary for placement of decorative boulders along the trail right-of-way and installation of signs and bollards at the trailheads and bridge approach.

B. Items which are not explicitly covered in these written specifications but are required to make a functioning installation shall not be misconstrued by the contractor as not being a part of the scope of work covered by the contract. Those items which are not specifically covered in these specifications, but are required to make a functioning installation, shall be constructed in accordance with the construction industry's highest standards.

1.1 RELATED SECTIONS

SP 01000 – Trail Construction
Section 01501 – Site Control

1.2 SUBMITTALS FOR REVIEW

A. Submit photo or other sample of decorative boulder to be used to the Owner for approval.

1.3 MEASUREMENT AND PAYMENT

A. Payment will be made on a unit price basis as bid by the Contractor. The price bid includes furnishing all labor, equipment and materials necessary for completing the work in place as specified in the design drawings.

B. The pay unit for Trailside Amenities will be Each (EA) and will be paid per each boulder placed, per each bollard installed, and per each sign installed.

C. Pay Items:

Pay Item	Description	Pay Unit
01400.01	Decorative Boulder 2' Diameter	EA
01400.02	Removeable Bollard	EA
01400.03	No Motor Vehicle Sign	EA

1.4 QUALITY CONTROL

A. Owner shall verify that Decorative Boulders meet product specifications prior to placement.

2. PRODUCTS

A. Decorative Boulders should be approximately two feet (2') in diameter.

B. Removeable Bollards shall be 8"x 8" timber post set in an aluminum or galvanized steel sleeve which is set in concrete, and marked with reflector tape as indicated in the design drawings, or an alternative design as approved by the Owner.

C. No Motor Vehicles Sign - MUTCD Type R5-3.

3. EXECUTION

A. Boulder Placement
   a. Place boulders along each edge of the trail right-of-way.
   b. Boulders should be placed on each side of the trail at a spacing of approximately 30 feet as indicated in the drawings.

B. Removable Bollards
   a. Place Bollards at locations indicated on the drawings.

   b. Excavate to a minimum diameter of thirty inches.

   c. Place drain pipe, sleeve, and chain as shown in drawings and set in concrete.

   d. Install post and connect to chain with pad lock.

C. No Motor Vehicles Sign
   a. Place two signs at each trailhead as indicated on the drawings.

   b. Excavate for sign post to a minimum 3.5 feet.

   c. Conform to AWPA standard M4 for handling pressure treated timber products.

   d. Install such that sign face is properly aligned with trail.

   e. Compact backfill material about newly installed sign post.

END OF SECTION – TRAILSIDE AMENITIES

SECTION 01501 – SITE CONTROL

1. GENERAL

1.1 WORK INCLUDED

The CONTRACTOR will prepare and submit a Site Control Plan (SCP) to the Owner as specified. The SCP will, at a minimum, provide a description of Erosion and Sediment Controls. Erosion and Sediment Controls must be at least as protective as those proposed in the design drawings.

1.2 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. State of Idaho:

1. A Landowners and Contractors Best Management Practices Guide for the Control and Treatment of Storm Water, Erosion and Sedimentation, Idaho Department of Environmental Quality, 1996.

2. Catalog of Storm Water Best Management Practices for Idaho Cities and Counties, Idaho Department of Environmental Quality, 2001.

1.3 RESPONSIBILITIES

The CONTRACTOR will comply will all applicable laws and regulations of any public entity having jurisdiction for safety of persons or property.

1.4 MEASUREMENT AND PAYMENT

A. Payment will be made on a unit price basis as bid by the Contractor. The price bid includes furnishing all labor, equipment and materials necessary for completing the work in place as specified in the design drawings.

B. The pay unit for Site Control will be Lump Sum (LS).

C. Pay Items:

Pay Item	Description	Pay Unit
01501.01	Site Control	LS

2. PRODUCTS

2.1 SITE CONTROL PLAN

A. The CONTRACTOR will provide a SCP for the review and comment by the Owner.

B. The SCP will contain a written description of erosion and sediment control, and clean access measures that the CONTRACTOR will employ during the completion of Work.

C. The CONTRACTOR will designate an on-site person to administer the requirements set forth by the SCP.

D. No on-site work will commence until the Owner has approved the SCP.

2.3 EROSION AND SEDIMENT CONTROL

A. The CONTRACTOR will provide temporary measures, such as silt fences, straw bales, berms, dikes, and drains, to prevent the following (at a minimum):

1. Tracking of contaminated material off-site.
2. Sediment discharge into the creek.
3. Discharge of stormwater runoff beyond work limits.

B. Products used for erosion control BMP's shall be in accordance with the IDEQ Catalog of Stormwater BMP's.

C. BMPs proposed in the design drawings provide the minimum level of erosion and sediment control that shall be utilized in the SCP.

3. EXECUTION

3.1 SITE CONTROL PLAN

A. The submittal to, and comment by the Owner of the "Site Control Plan" will be completed prior to the initiation of on-site activities.

B. A copy of the SCP will be kept on site during the implementation of the project.

C. Once a person has been assigned by the CONTRACTOR to administer the SCP, the CONTRACTOR will make available the name and on site contact information for the person to the Owner.

3.3 EROSION AND SEDIMENT CONTROL

A. The CONTRACTOR will plan and execute construction by methods to control surface drainage and prevent sediment from leaving the controlled site.

B. The CONTRACTOR will implement temporary measures, such as straw wattles, stabilized construction entrances, berms, dikes, and drains, to prevent sediment discharge or tracking off site.

C. The CONTRACTOR will inspect, maintain, and repair temporary erosion and sediment control measures at least once per week during construction and immediately after any storm event that has a 24-hour total rainfall of 0.25 inch or greater.

3.6 EQUIPMENT OPERATIONS AND MAINTENANCE AND SPILL CONTROL

A. Protection of the environment from petroleum products is important to this project. The Contractor will take precautions to assure no fuel, oil, and other products contaminate the project site.

B. All equipment will be inspected for leaks before entering the project site and daily while on-site.

C. Spill Kits will be available on-site to contain and cleanup a spill. Kits will contain, at a minimum, spill absorbent materials such as granules, pads, containment booms, etc. Kits will be stored near work and fueling areas.

D. Spills in porous materials, gravel/sands, must be excavated to below the impacted area and any waste material, if any, taken off-site, and handled in an appropriate and legal manner.

E. Fueling will be done a minimum of 100 feet from open water. The Contractor will take measures to protect groundwater from spilled fuel.

F. Transport fuel during dry weather periods and during daylight hours only.

G. Contractor may not use pup trailers for fuel transport

H. Fuel transporter, equipment operator, and field crews will comply will all applicable federal, state, and local regulations related to hazardous material spills and transport, transfer, and storage of petroleum fuels.

I. If a spill of chemical pollutants such as fuel or hydraulic fluid should occur, immediately attempt to contain the spilled material. At a minimum, the following procedure shall be followed.

1. For spillage on land, construct earthen berms or use other suitable barricade material of sufficient size to contain the spill and keep it from spreading. Also store absorbent materials on-site and within vehicles for immediate response if a spill should occur.

2. For spillage on water, attempt to isolate and contain the spilled material. Commercial booms or other suitable material shall be kept close to the active work area to contain fuel oil spills on water.

3. Call the appropriate office of Idaho Department of Environmental Quality. Contact Hazardous Waste Science Officer, 208-373-0198.

4. Call the Coeur d'Alene Tribe Water Resources Program at 208-686-0252.

END OF SECTION – SITE CONTROL

SECTION 01502 – TRAFFIC CONTROL

1. GENERAL

1.1 WORK INCLUDED

The CONTRACTOR will prepare and submit a Traffic Control Plan (TCP) to the Owner. The TCP will, at a minimum, show proposed signs and locations of traffic controls and meet the minimum requirements shown in the proposed TCP in the design drawings.

1.2 MEASUREMENT AND PAYMENT

A. Payment will be made on a unit price basis as bid by the Contractor. The price bid includes furnishing all labor, equipment and materials necessary for completing the work in place as specified in the design drawings.

B. The pay unit for Traffic Control will be Lump Sum (LS).

C. Pay Items:

Pay Item	Description	Pay Unit
01502.01	Traffic Control	LS

2. PRODUCTS

2.1 TRAFFIC CONTROL PLAN

A. The CONTRACTOR will provide a TCP for the review and comment by the Owner.

2.2 TRAFFIC SIGNS

A. The CONTRACTOR will furnish and install all signs, cones, or other products necessary as proposed in the TCP.

3. EXECUTION

3.1 TRAFFIC CONTROL PLAN

A. The submittal to, and comment by the Owner of the “Traffic Control Plan” will be completed prior to the initiation of on-site activities.

B. A copy of the TCP will be kept on site during the implementation of the project.

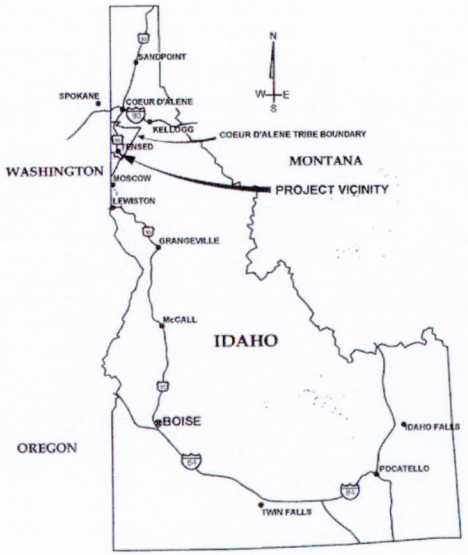
C. Contractor will install all signs, cones, and other traffic control measures prior to the initiation of on-site activities.

END OF SECTION – TRAFFIC CONTROL

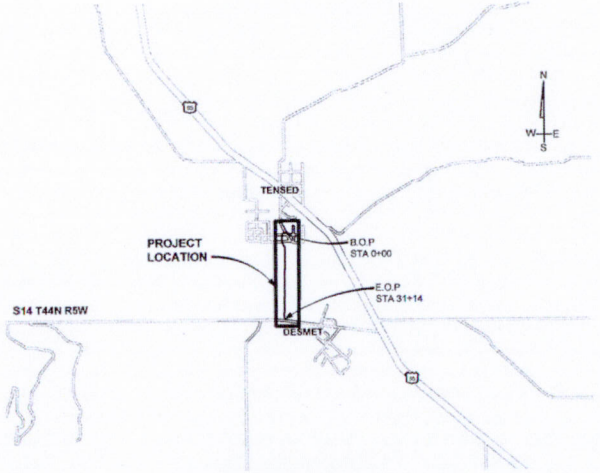
COEUR D'ALENE TRIBE
DESMET-TENSED TRAIL PROJECT
BENEWAH COUNTY, IDAHO
JUNE 2009

PROJECT CONTROL NUMBERS:
BIA P05097
IDOT A009(752)

SAFETY:
ROUTE 95
SEC. 80
BIA CLASS 8
LENGTH 0.6 MILES
BRIDGE 100 FT
DESIGN SPEED 12 MPH
FOR BICYCLES
MAX GRADE 7.4%



VICINITY MAP
SCALE: NTS



LOCATION MAP
SCALE: NTS

SHEET INDEX

SHEET #	SHEET TITLE	SHEET INDEX #
1	COVER SHEET	CS
2	TRAIL PLAN & PROFILE SHEET - NORTH	C-1
3	TRAIL PLAN & PROFILE SHEET - SOUTH	C-2
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5	STANDARD TRAIL DETAILS	D-2
6	BRIDGE PLAN AND PROFILE	B-1
7	BRIDGE DETAILS	B-2
8	EROSION AND SEDIMENT CONTROL PLAN	ESC
9	TRAFFIC CONTROL PLAN	TCP
10	FARM EQUIPMENT ACCESS	F-1

COEUR D'ALENE TRIBE

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REGISTERED
12175
6-25-2009
STATE OF IDAHO
DEREK FORSETH

PLAN APPROVAL

COEUR D'ALENE TRIBE

NO.	DATE	REVISIONS	BY	CHK

DRAWN: C.H.
ENGINEER: DF D.O.F
CHECKED: DF D.O.F
DATE: 06/25/2009
COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
SCALE: AS NOTED
APPROVED:
DATE:

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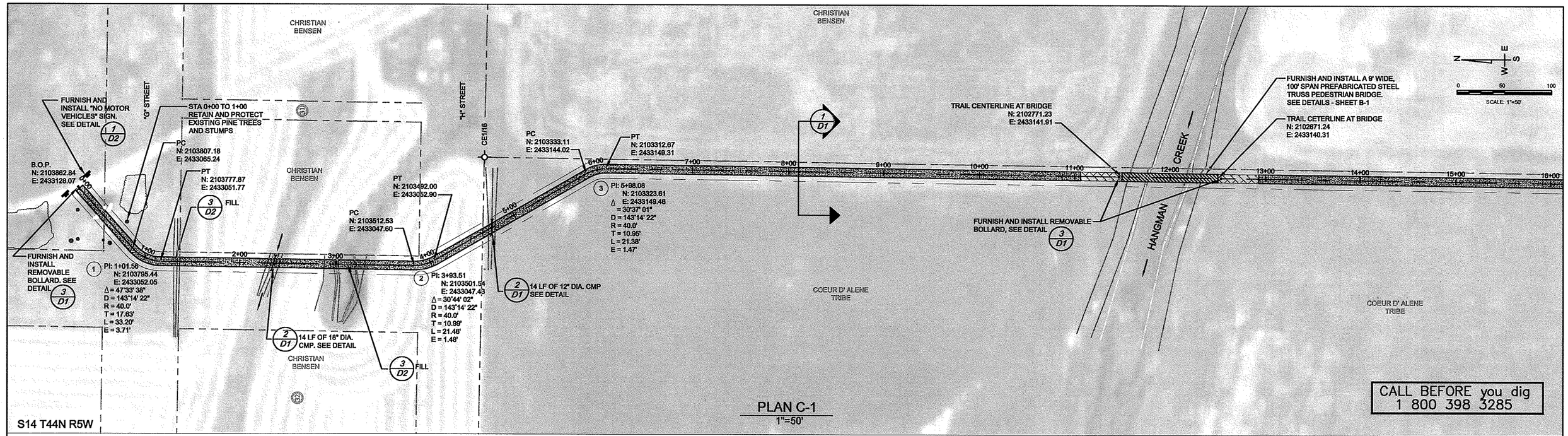
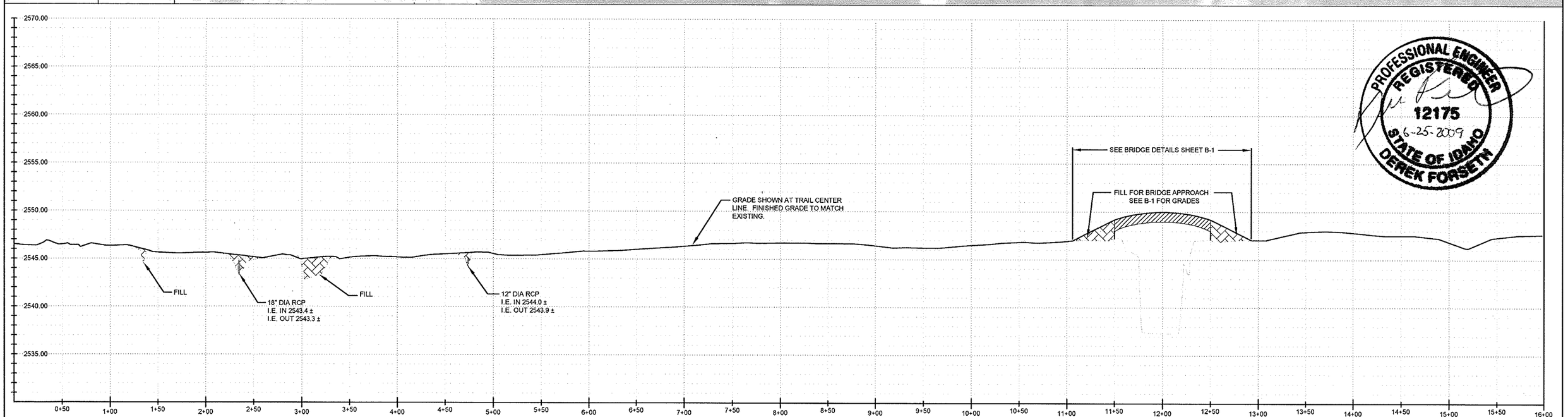
COEUR D'ALENE TRIBE
DESMET-TENSED TRAIL

SHEET INDEX: CS
DATE: 06/25/2009
PROJECT NO: 08205
SHEET: 1 OF 10



PLAN C-1
1"=50'



PROFILE C-1
HORIZ: 1"=50'
VERT: 1"=5'

NO.	DATE	REVISIONS	BY	CHK

FILE NAME:

DRAWN: C.H. K. K.	COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
ENGINEER: DF D.O.F.	SCALE: AS NOTED (FOR 22" x 34")
CHECKED: DF	APPROVED:
DATE:	DATE:

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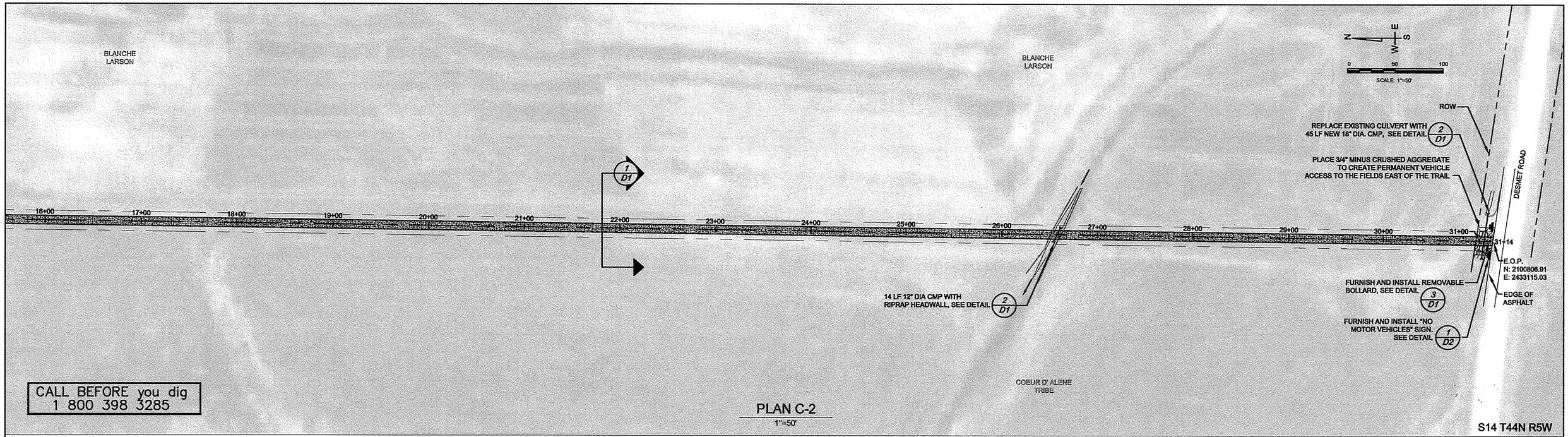
COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

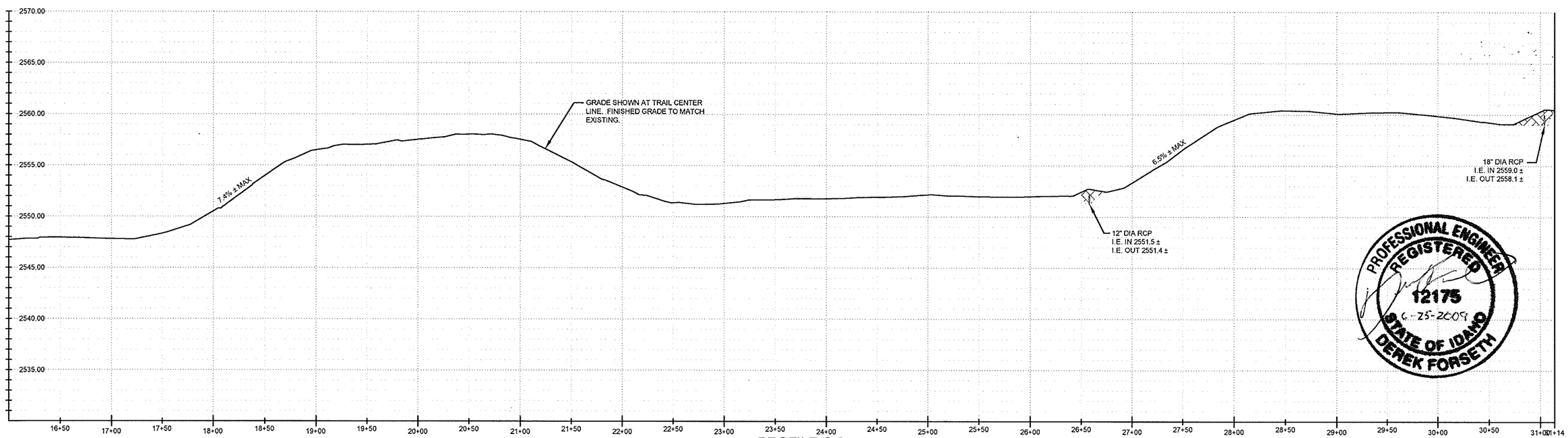
TRAIL PLAN AND PROFILE

SHEET INDEX:	C-1
DATE:	06/25/2009
PROJECT NO:	08205
SHEET:	2 OF 10



PLAN C-2

1"=50'



PROFILE C-2

HORIZ: 1"=50'
VERT: 1"=5'

NO.	DATE	REVISIONS	BY	CHK

FILE NAME:

DRAWN: C.H. K.K.	COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
ENGINEER: DF D.O.F.	SCALE: AS NOTED (FOR 22" x 34")
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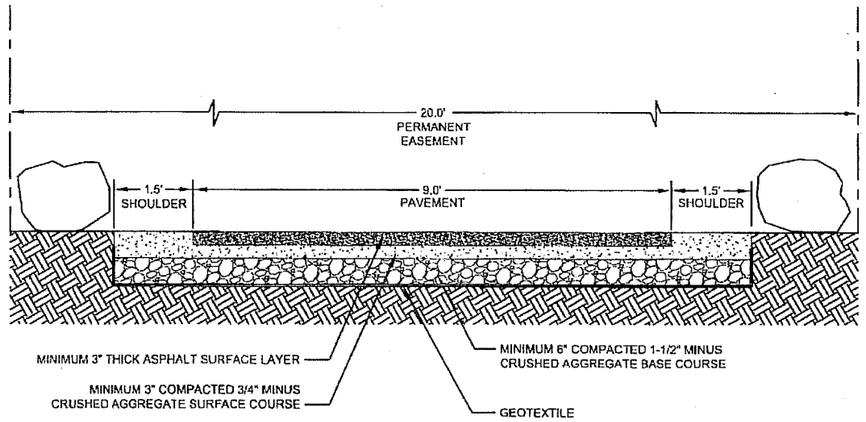
COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

TRAIL PLAN AND PROFILE

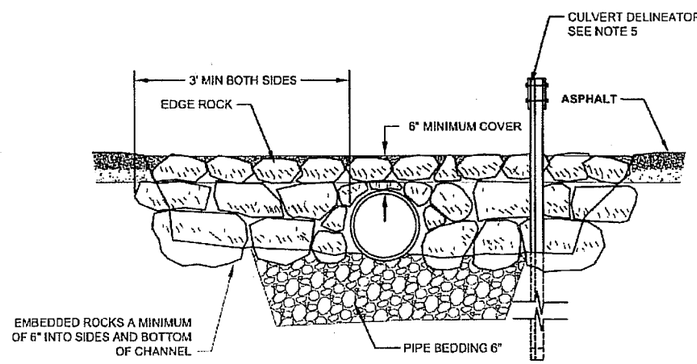
SHEET INDEX:	C-2
DATE:	06/25/2009
PROJECT NO:	08205
SHEET:	3 OF 10



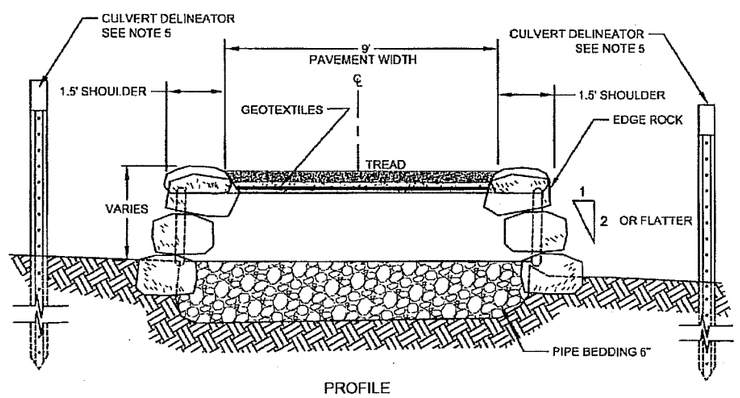
NOTE:
1. SURFACE COURSE SHALL BE FLUSH WITH ADJACENT GRADE EXCEPT AT CROSSINGS AND BRIDGE APPROACHES.
2. PLACE DECORATIVE BOULDERS ALONG TRAIL EDGE AS SHOWN APPROXIMATELY EVERY 30 FEET.

1 TRAIL CROSS-SECTION

SCALE: NTS



SECTION

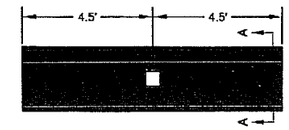


PROFILE

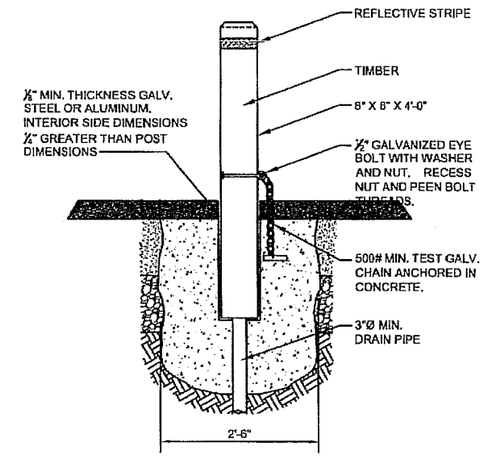
NOTES:
1. INSTALL CULVERT LEVEL WITH ADJACENT GRADE
2. BEDDING AND BACKFILL SHALL BE 1-1/2" MINUS CRUSHED AGGREGATE
3. HEADWALL AND EDGE ROCKS SHALL BE NO. 1 RIPRAP AS DESCRIBED IN THE SPECIAL PROVISIONS
4. PIPE DIAMETER VARIES. SEE PLAN SHEETS
5. CULVERT DELINEATORS SHALL BE MUTCD TYPE 2 OBJECT MARKERS ON U-CHANNEL POST INSTALLED NEAR END OF PIPE.

2 CULVERT WITH HEADWALLS

SCALE: NTS



REMOVABLE BOLLARD
PLAN VIEW



REMOVABLE BOLLARD
SECTION A-A

NOTES:
1. TIMBER SHALL BE DOUGLAS FIR, DENSE CONSTRUCTION GRADE, AND SHALL BE PRESSURE TREATED WITH A WATERBORNE PRESERVATIVE (ACA, CCA, ACZA) TOP 5" OF TIMBER SHALL BE PAINTED WHITE.
2. STEEL TUBE SHALL CONFORM TO ASTM A53 GRADE A.
3. NUTS, BOLTS AND WASHERS SHALL CONFORM TO ASTM A307.
4. ALL STEEL PARTS SHALL BE GALVANIZED.
5. CONCRETE SHALL BE CLASS 3000.

3 REMOVABLE BOLLARD DETAIL

SCALE: NTS

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DATE:		DATE:	

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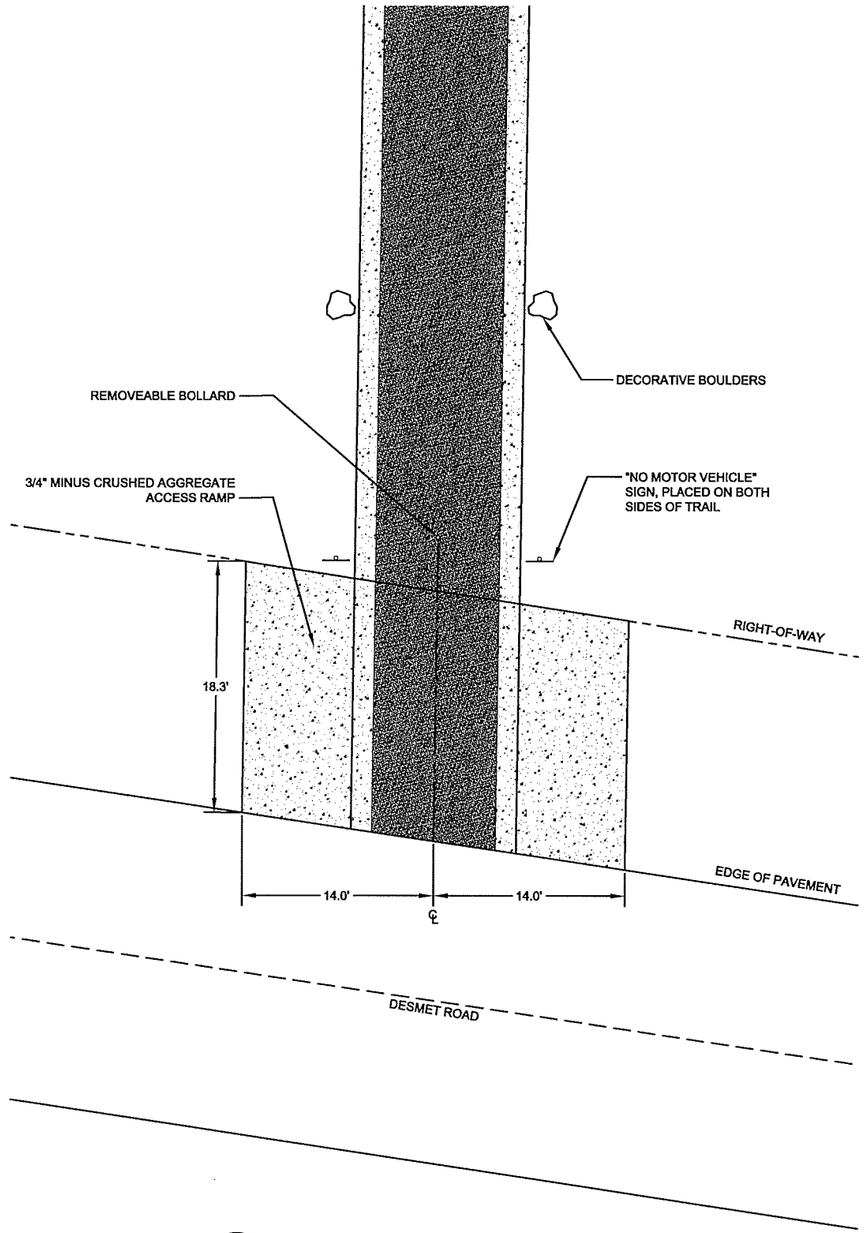
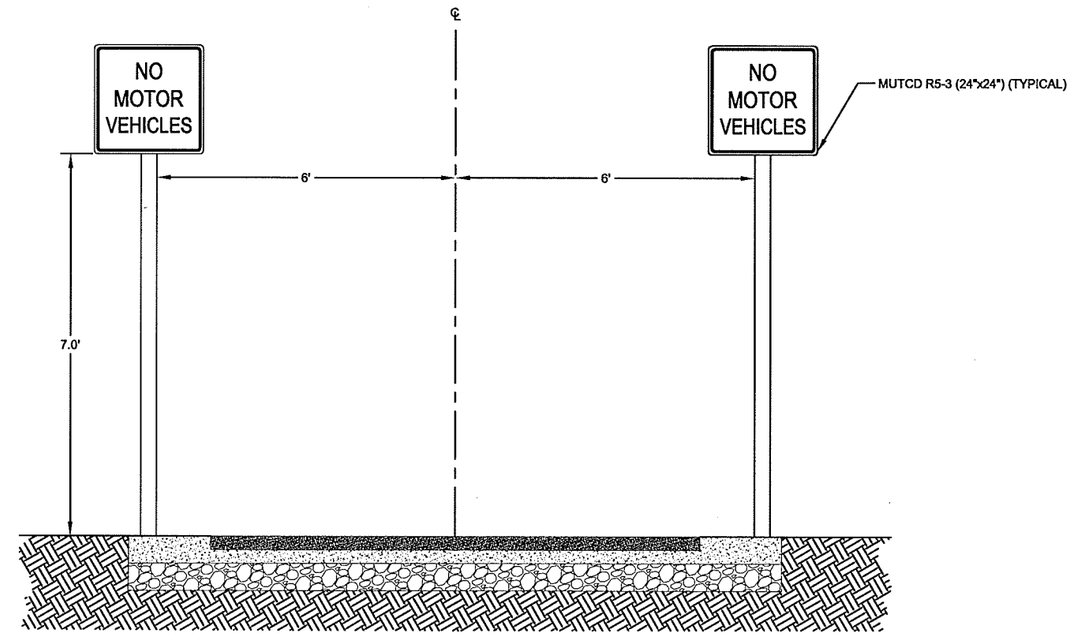
COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

STANDARD TRAIL
DETAILS

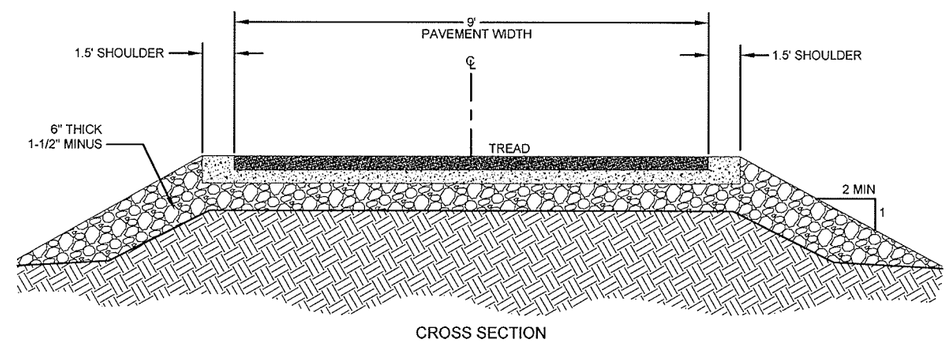
SHEET INDEX:	D-1
DATE:	08/25/2009
PROJECT NO:	08205
SHEET:	4 OF 10



1 TRAIL END PLAN VIEW
SCALE: NTS



2 TYPICAL INSTALLATION FOR SIGNS
SCALE: NTS



3 FILL DETAILS
SCALE: NTS

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12175
6-25-2009
STATE OF IDAHO
DEREK FORSETH

NO.	DATE	REVISIONS	BY	CHK

FILE NAME:

DRAWN: C. H. K. K.	COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
ENGINEER: DF D.O.F.	SCALE: AS NOTED
CHECKED: DF	APPROVED:
DATE:	DATE:

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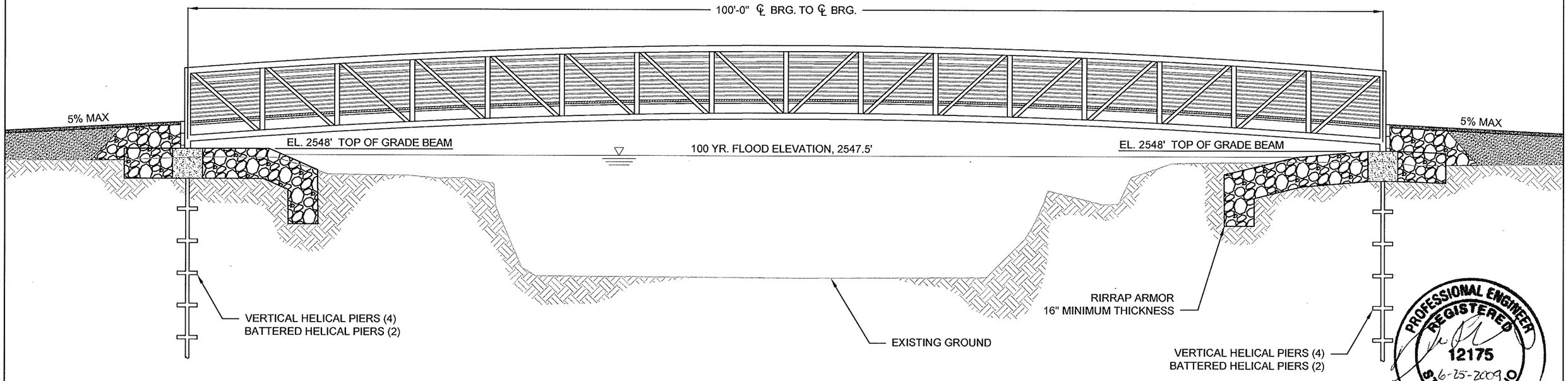
COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

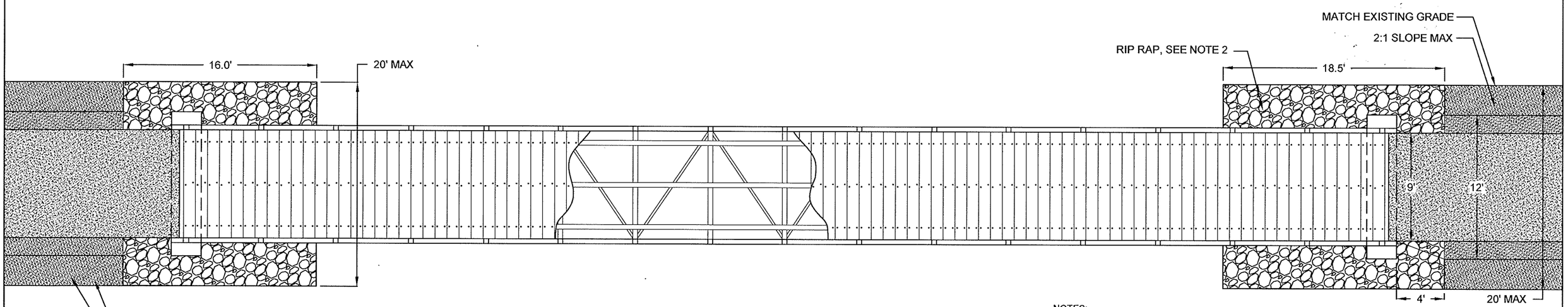
STANDARD TRAIL
DETAILS

SHEET INDEX:	D-2
DATE:	06/25/2009
PROJECT NO:	08205
SHEET:	5 OF 10



1 - PROFILE VIEW OF BRIDGE
SCALE: 1" = 4'

PROFESSIONAL ENGINEER REGISTERED 12175 6-25-2009 STATE OF IDAHO DEREK FORSETH



NOTES:
1. KEEP TOE OF FILL WITHIN 20-FT WIDE EASEMENT.
2. RIPRAP SHALL BE PER SPEC. SECTION SP01100 SECTION 2.D.

2 - PLAN VIEW OF BRIDGE
SCALE: 1" = 4'

NO.	DATE	REVISIONS	BY	CHK

FILE NAME:

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ENGINEER: DF D.O.F.	SCALE: AS NOTED (FOR 22" x 34")
CHECKED: DF	APPROVED:
DATE:	DATE:

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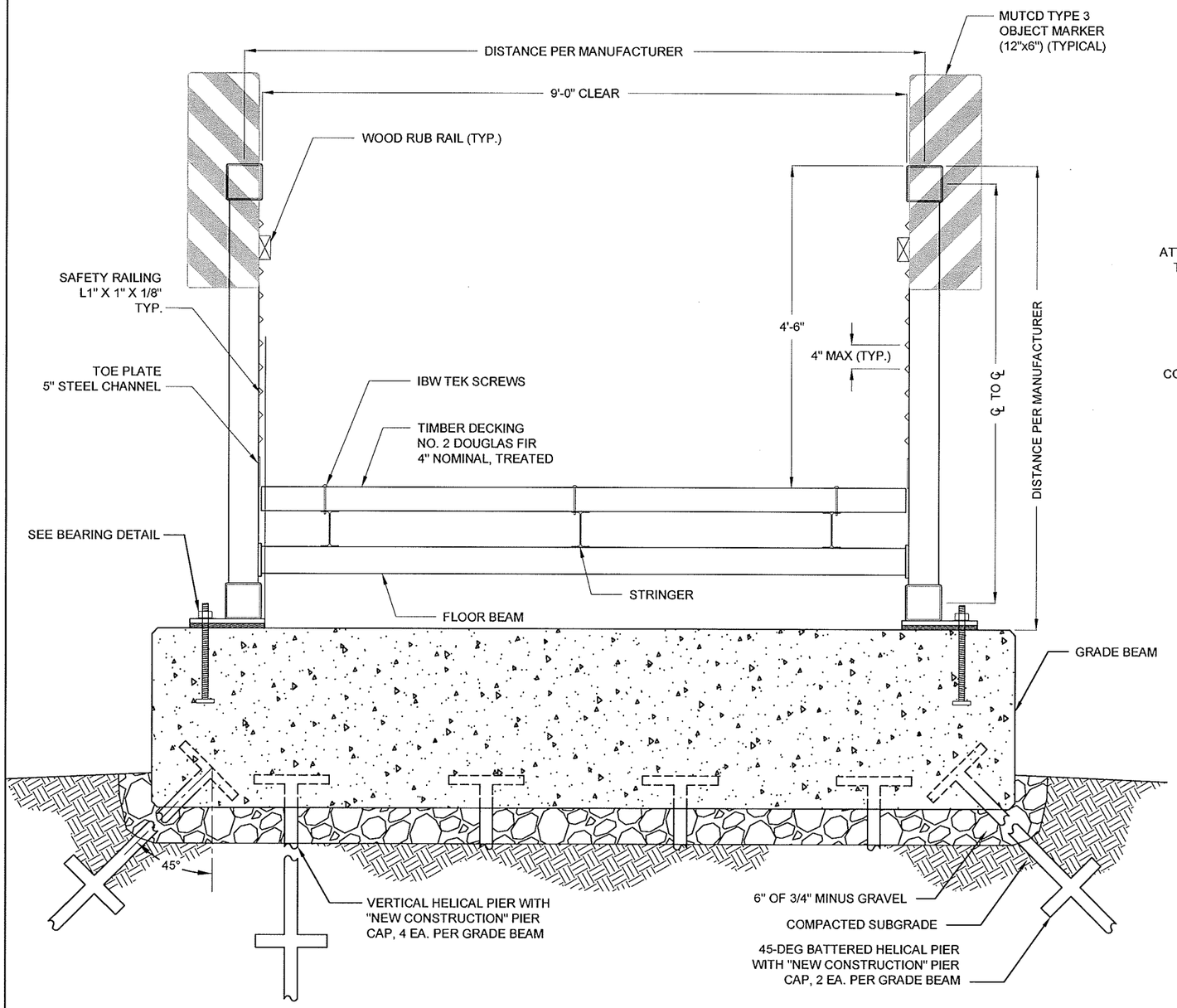
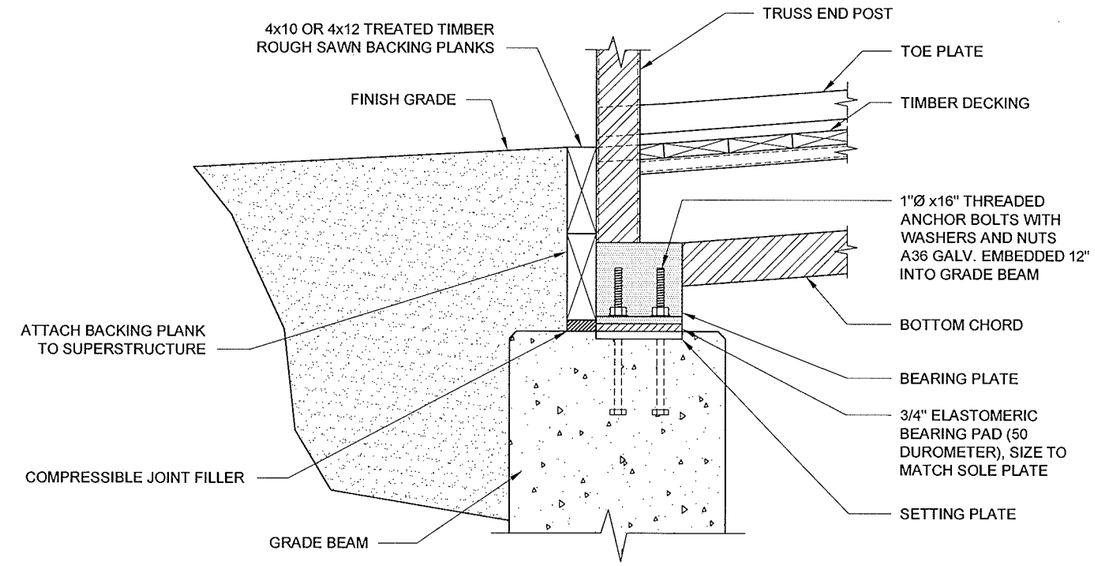
COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

BRIDGE PLAN & PROFILE

SHEET INDEX:	B-1
DATE:	06/25/2009
PROJECT NO:	08205
SHEET:	6 OF 10



1 - TYP. SECTION
SCALE: NTS



2 - BEARING DETAIL
SCALE: NTS

NOTE:
1. THIS DRAWING PROVIDES A GENERAL REPRESENTATION OF THE BRIDGE AND BEARING STRUCTURE REQUIREMENTS. CONTRACTOR SHALL PROVIDE FINAL DESIGN IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.

NO.	DATE	REVISIONS	BY	CHK

FILE NAME:

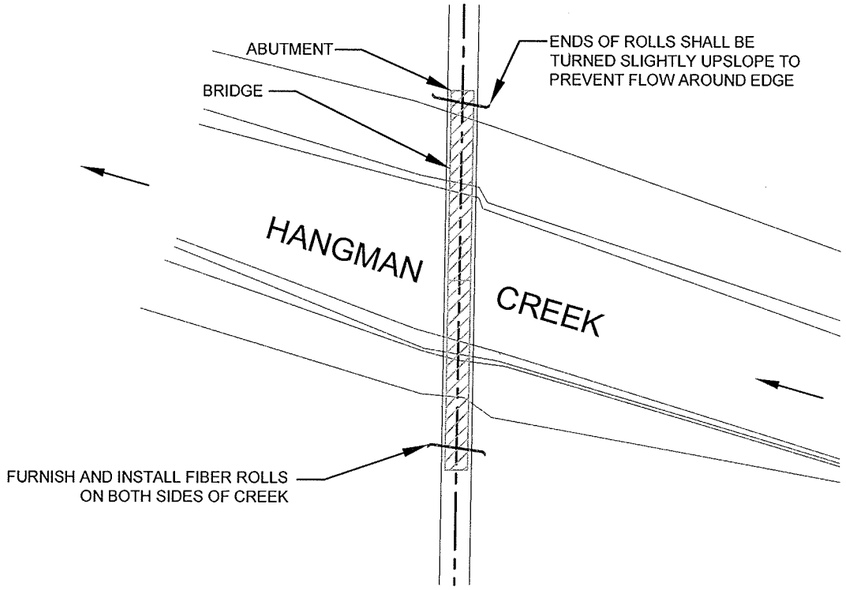
DRAWN: C.H.
ENGINEER: DF D.O.F.
CHECKED: DF
DATE:
COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
SCALE: AS NOTED (FOR 22" x 34")
APPROVED:
DATE:

TerraGraphics
Environmental Engineering, Inc.

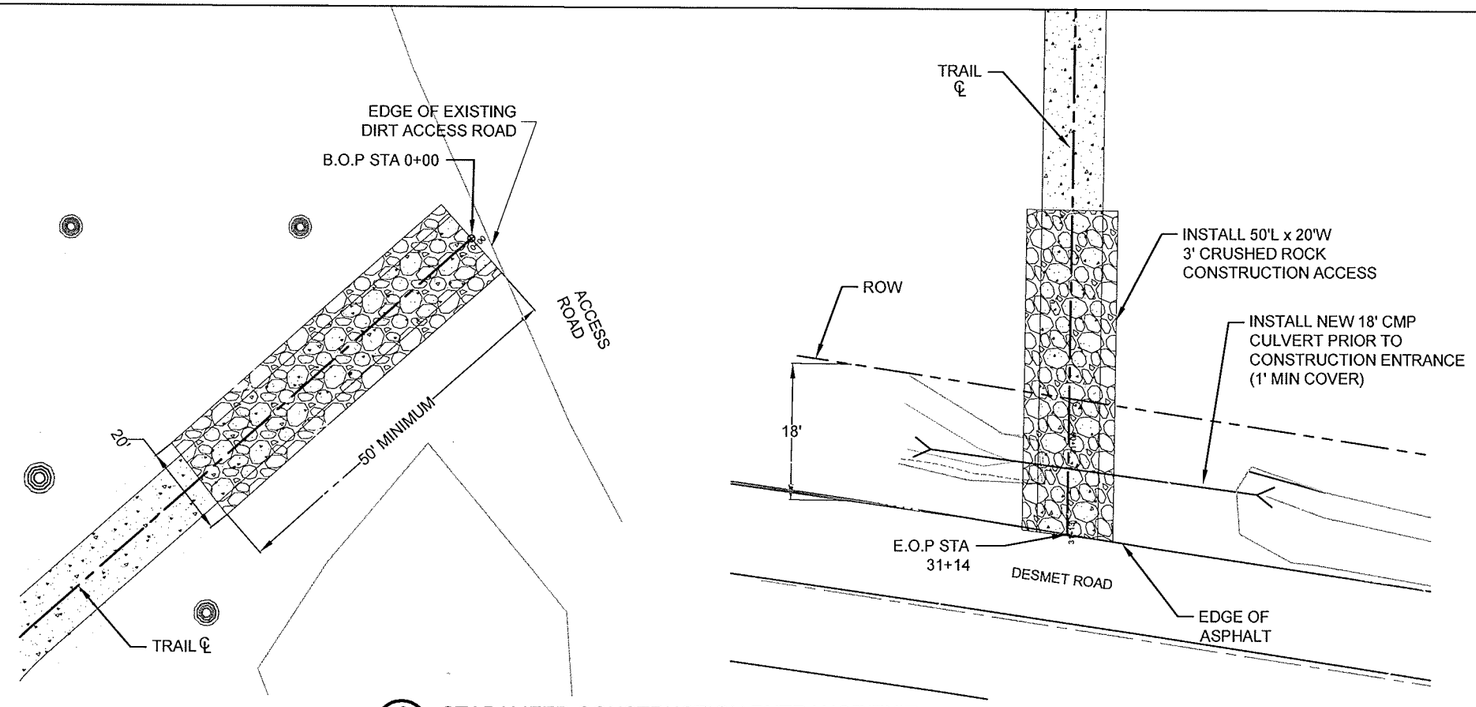
COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

BRIDGE DETAILS

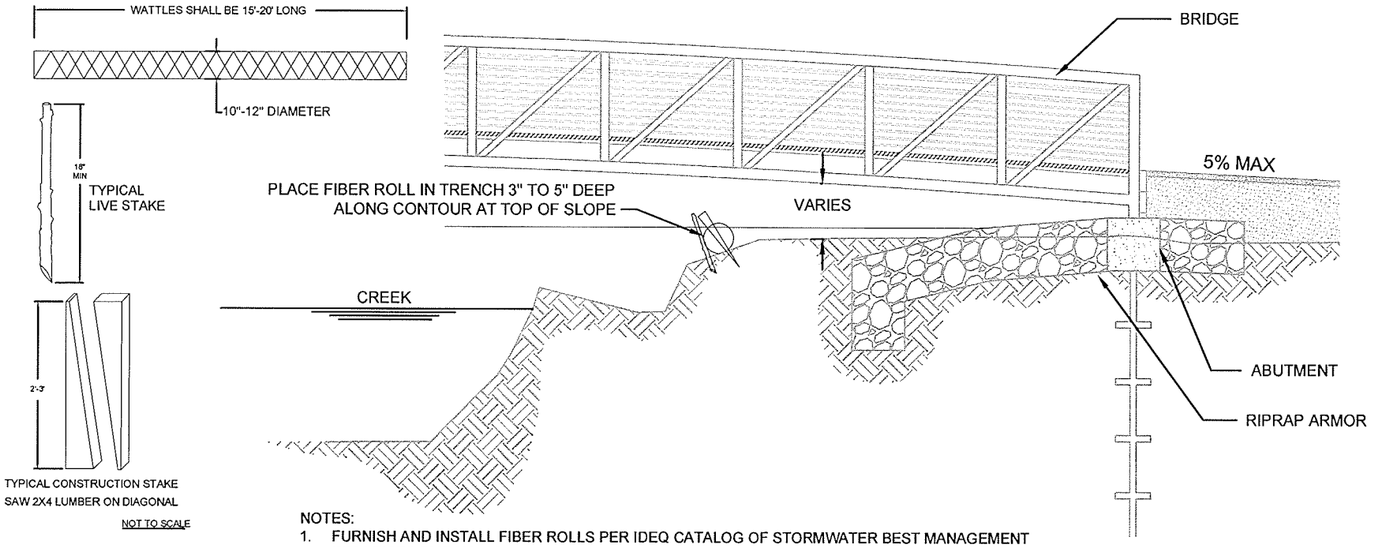
SHEET INDEX: B-2
DATE: 06/25/2009
PROJECT NO: 08205
SHEET: 7 OF 10



1 - FIBER ROLL PLACEMENT
SCALE: NTS

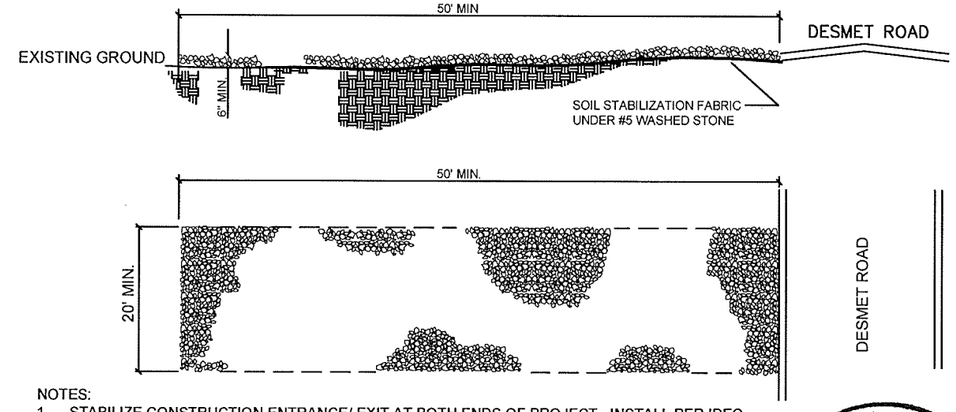


3 - STABALIZED CONSTRUCTION ENTRANCE/EXIT
SCALE: NTS



NOTES:
1. FURNISH AND INSTALL FIBER ROLLS PER IDEQ CATALOG OF STORMWATER BEST MANAGEMENT PRACTICES BMP NO. 35.
2. CASING SHOULD BE BIODEGRADABLE TUBULAR PLASTIC OR SIMILAR MATERIAL.
3. INSTALL FIBER ROLLS PRIOR TO CONDUCTING OTHER WORK WITHIN VICINTY OF HANGMAN CREEK.

2 - FIBER ROLL INSTALLATION DETAIL
SCALE: NTS



NOTES:
1. STABILIZE CONSTRUCTION ENTRANCE/ EXIT AT BOTH ENDS OF PROJECT. INSTALL PER IDEQ CATALOG OF STROMWATER BEST MANAGEMENT PRACTICES BMP 5.
2. FILTER FABRIC SHALL BE USED AS A BASE FOR THE CONSTRUCTION ENTRANCE.
3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC STREETS OR EXISTING PAVEMENT. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS WARRANT AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
4. ANY SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC STREETS MUST BE REMOVED AT THE END OF EACH WORK DAY.
5. ROCK USED FOR BMP 5 MAY BE LEFT IN PLACE. INSTALL ENTRANCE SUCH THAT TRAIL MAY BE BUILT ON TOP OF ENTRANCE.

PROFESSIONAL ENGINEER REGISTERED 12175 6-25-2009 STATE OF IDAHO DEREK FORSETH

4 - STABILIZED CONSTRUCTION ENTRANCE/EXIT DETAILS
SCALE: NTS

NO.	DATE	REVISIONS	BY	CHK

FILE NAME:

DRAWN: K. K	COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
ENGINEER: DF D.O.F.	SCALE: AS NOTED
CHECKED: DF	APPROVED:
DATE:	DATE:

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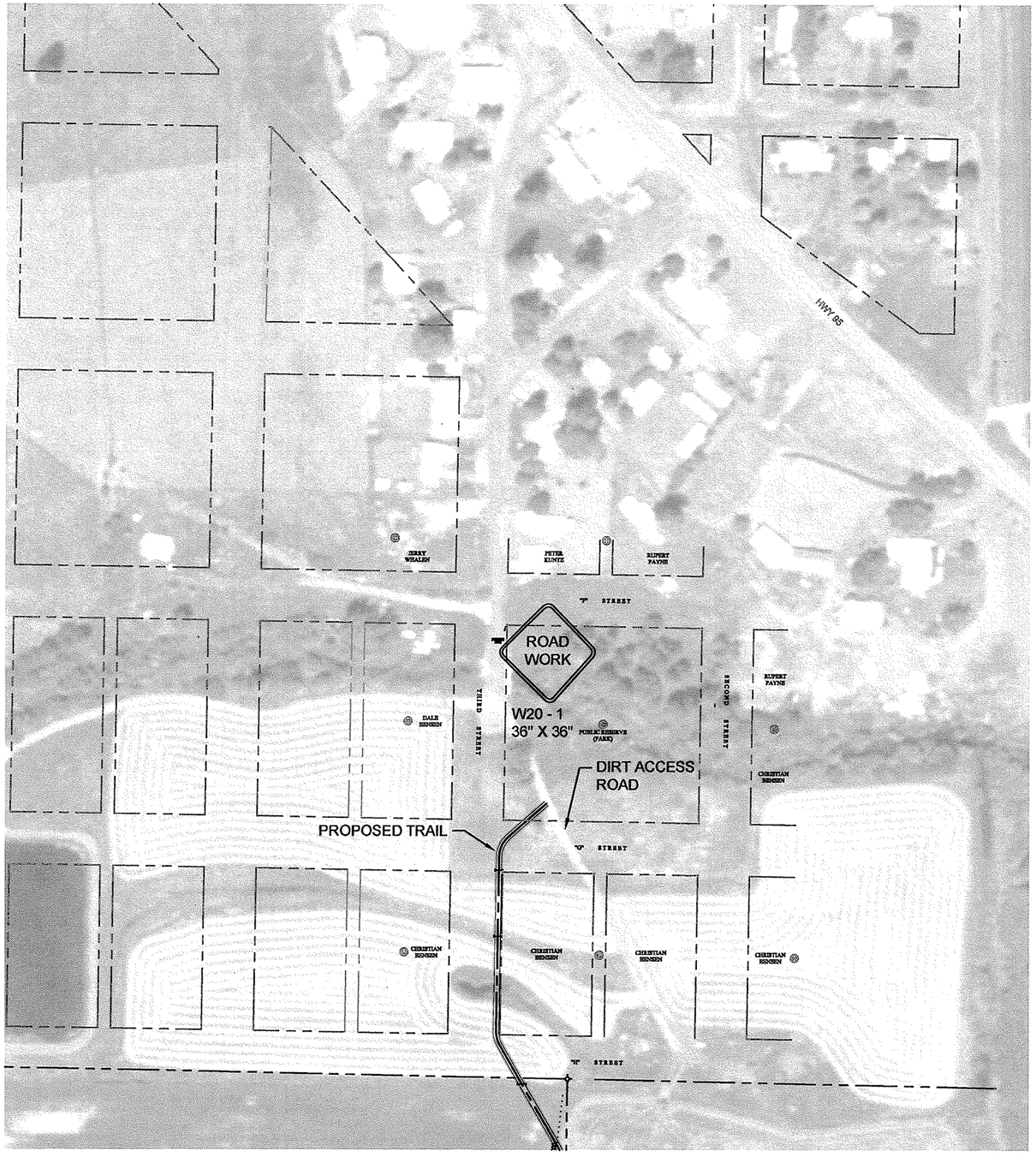
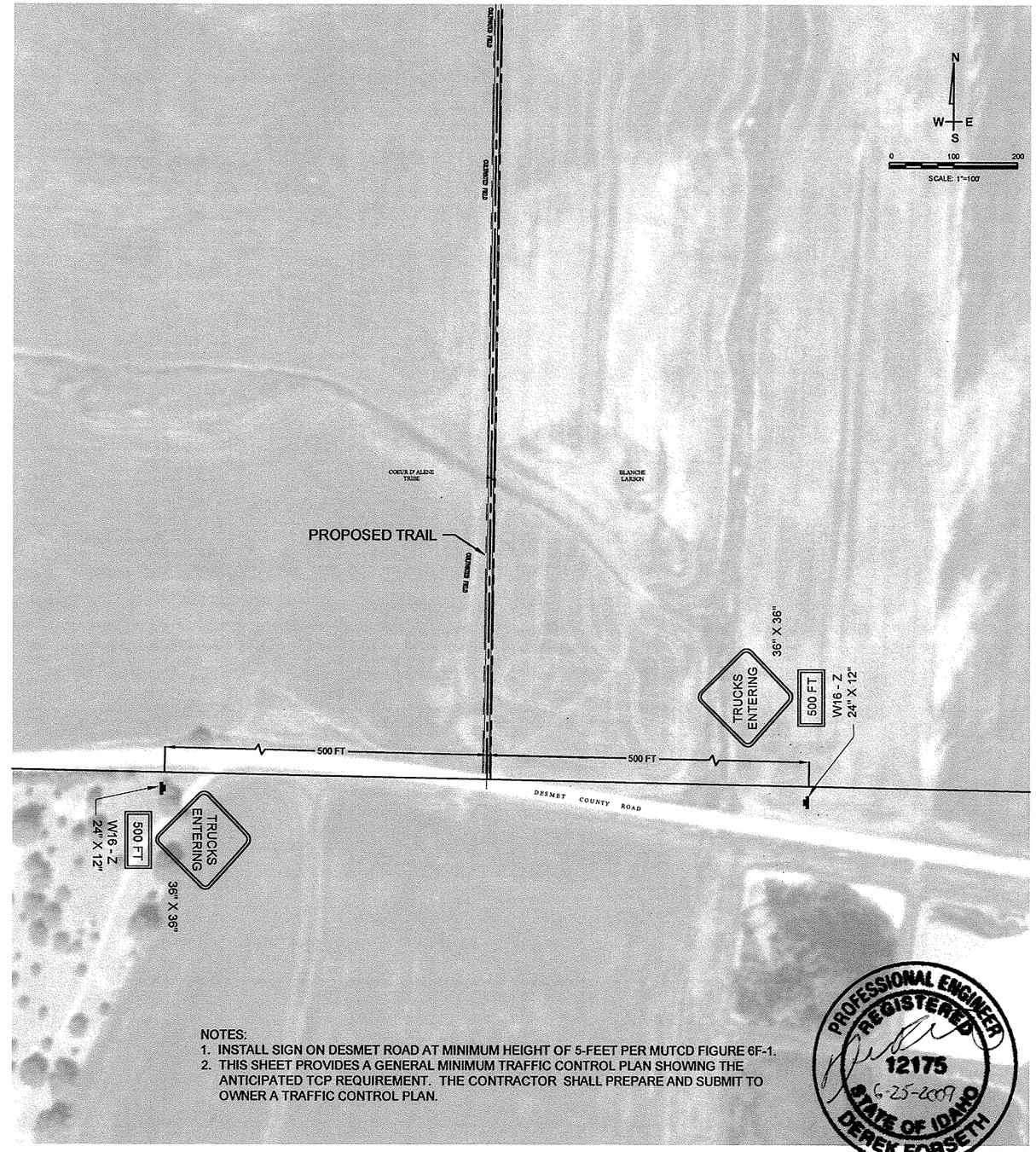
Environmental Engineering, Inc.

COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

EROSION AND SEDIMENT CONTROL PLAN

SHEET INDEX:	ESC
DATE:	06/25/09
PROJECT NO:	08205
SHEET:	8 OF 10





NOTES:
1. INSTALL SIGN ON DESMET ROAD AT MINIMUM HEIGHT OF 5-FEET PER MUTCD FIGURE 6F-1.
2. THIS SHEET PROVIDES A GENERAL MINIMUM TRAFFIC CONTROL PLAN SHOWING THE ANTICIPATED TCP REQUIREMENT. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO OWNER A TRAFFIC CONTROL PLAN.

PROFESSIONAL ENGINEER REGISTERED 12175 6-25-2009 STATE OF IDAHO DEREK FORSETH

NO.	DATE	REVISIONS	BY	CHK

FILE NAME:

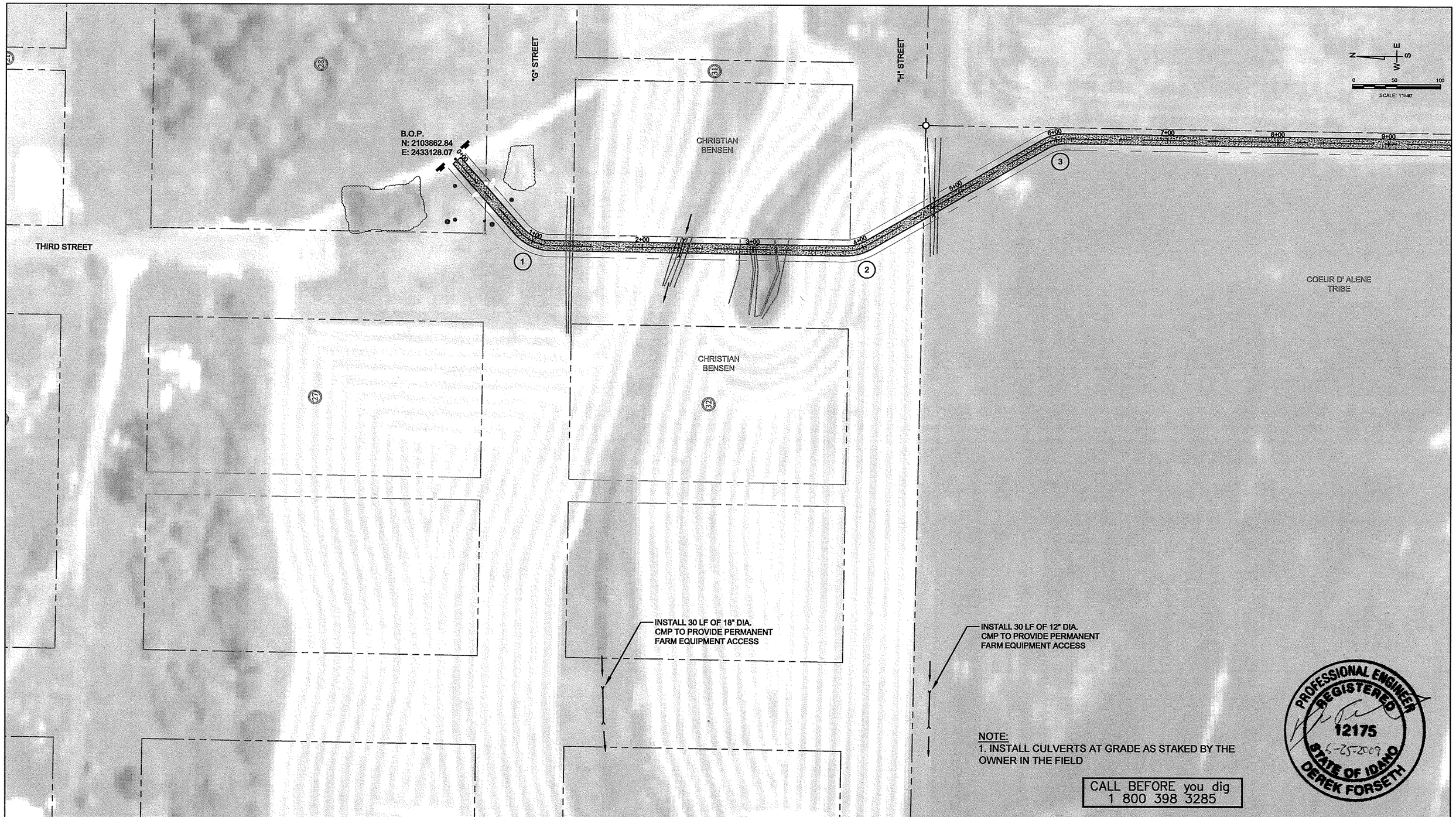
DRAWN: K. K.	COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
ENGINEER: DF D.O.F.	SCALE: 1" = 100' (FOR 22" x 34")
CHECKED: DF	APPROVED:
DATE:	DATE:

TerraGraphics
Environmental Engineering, Inc.

COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

TRAFFIC CONTROL PLAN

SHEET INDEX:	TCP
DATE:	06/25/2009
PROJECT NO:	08205
SHEET:	9 OF 10



NOTE:
1. INSTALL CULVERTS AT GRADE AS STAKED BY THE OWNER IN THE FIELD

CALL BEFORE you dig
1 800 398 3285

NO.	DATE	REVISIONS	BY	CHK

DRAWN: C.H.	COORDINATE SYSTEM: ISP, ZONE W., NAD83, FT
ENGINEER: DF D.O.F.	SCALE: 1" = 40' (FOR 22" x 34")
CHECKED: DF	APPROVED:
DATE:	DATE:

TerraGraphics
Environmental Engineering, Inc.

COEUR D'ALENE TRIBE
DESMET - TENSED TRAIL

FARM EQUIPMENT ACCESS

SHEET INDEX:	F-1
DATE:	06/25/2009
PROJECT NO:	08205
SHEET:	10 OF 10

APPENDIX A

PRICE PROPOSAL
DESMET-TENSED TRAIL PROJECT

Bidder Name: _____

Complete the bid sheet below. Quantities identified in the bid sheet are approximately estimates for the project and are to be used for hourly and unit pricing for the anticipated work. The estimated quantities are not guaranteed. The actual quantities may vary from these estimates. Payment will be based on quantities identified during the work and verified by the Owner. The Owner reserves the right to negotiate unit prices for individual line items prior to contract award. There will be no hourly rate adjustment for work over 40 hours per week. There will be no payment for standby time.

ITEM NO.	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL COST
1000.01	TRAIL CONSTRUCTION	3012	LF		
1100.01	12" DIAMETER RCP	110	LF		
1100.02	18" DIAMETER RCP	45	LF		
1200.01	FURNISH AND INSTALL 9' WIDE 100' SPAN STEEL TRUSS TRAIL BRIDGE	1	LS		
1200.02	BRIDGE BEARING SYSTEM	1	LS		
1200.03	STRUCTURAL FILL	12	CY		
1300.01	FILL MATERIAL	40	CY		
1300.02	EROSION CONTROL BLANKET	80	SY		
1400.01	DECORATIVE BOULDER 2' DIAMETER	200	EA		
1400.02	REMOVABLE BOLLARD	4	EA		
1400.03	NO MOTOR VEHICLE SIGN	4	EA		
1500.01	SITE CONTROL	1	LS		
1500.02	TRAFFIC CONTROL	1	LS		
	MOBILIZATION	1	LS		

TOTAL BID _____

APPENDIX B

ITD SPECIAL PROVISION S637

S637 - ASPHALTIC SHARED-USE PATH Required 9/27/07

Description. This work shall consist of clearing and grubbing, grading, base, and plant mix HMA for Shared-use Path in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross section(s) shown on the plans.

Materials. All aggregate shall be obtained from approved Contractor Furnished Sources. Asphalt binder shall meet the applicable requirements of Section 702- Asphalt.

A. Plant mix for Shared Use Path. The hot mix shall be composed of a mixture of ¾ inch, 1/2-in. or 3/8 in. nominal maximum size aggregate, natural filler or commercial additives, if required, and asphalt binder.

The asphalt binder shall be PG 58-28 unless otherwise approved. A minimum ½ percent anti-strip additive shall be used.

A maximum of 20% reclaimed asphalt pavement (RAP) may be included as part of the job mix formula. Reclaimed asphalt pavement shall be processed as needed to pass through a 1/2-inch screen prior to introduction to the mix.

N_{design} per AASHTO T-312 shall be 40 or greater. Volumetric testing will not be required. The contractor may use an existing commercial Superpave mix design.

Aggregate for plant mix may be provided in a single stockpile or previously existing stockpile(s).

The aggregate as crushed shall have a sand equivalent of not less than 30.

B. Aggregate for Base for Shared-use Path. Aggregate shall conform to one of the following gradations when tested in accordance with AASHTO T-27 with no wash required:

	NOMINAL MAXIMUM SIZE		
SIEVE SIZE	*3/8 in.*	*1/2 in.*	*3/4 in.*
		PERCENT PASSING	
1 in. (25 mm)			100
3/4 in. (19 mm)		100	90-100
1/2 in. (12.5 mm)	100	90-100	
3/8 in. (9.5 mm)	85-100		
No. 4 (4.75 mm)	55-75	50-70	40-65
No. 8 (2.36 mm)	40-60	35-55	30-50
No. 30 (0.600 mm)	20-40	12-30	

No. 200 (0.075 mm)	3-10	3-10	3-10

The aggregate as crushed shall have a sand equivalent of not less than 30.

Construction Requirements.

A. Plant mix for Shared-use Path. The Contractor shall provide a job mix formula to the Engineer, at least five days prior to the start of paving, which meets the requirements. A qualified laboratory at the Contractor's expense shall prepare the job-mix formula. The job-mix formula shall use the type and grade of asphalt specified and the brand and source of asphalt and additives the contractor proposes to use on the project.

An acceptance test strip is not required. Plant mix placement shall not begin until authorized.

Mixing and placement procedures shall be as specified in the appropriate portions of the Subsection 405.03.

Compaction shall consist of a minimum of 4 passes of vibratory equipment while the material is at or above 185˚ F. Compaction shall be performed in such a manner that cracking, shoving, or displacement will be avoided.

IRI Smoothness testing will not be required.

Unless otherwise specified, the plant mix layer shall be 0.20' thick.

B. Base. Aggregate Base for Shared-use Path shall be placed in accordance with the applicable portions of Subsection 303.03.

Compaction shall consist of a minimum of six complete coverages with a tandem steel drum vibratory roller or as directed. Compaction equipment shall be in accordance with Subsection 306.03.

Unless otherwise specified, base thickness shall be 0.4'.

Acceptance.

A. Plant mix for Shared-use Path. The plant mix pavement will be accepted by certification using form ITD-851. The contractor shall submit quality control test results for every 500 tons of plant mix placed, with a minimum of one test per project, indicating the asphalt content (AASHTO T-308) and gradation (AASHTO T-30) to verify the certification. The quality control sampling and testing shall be performed by a qualified independent laboratory and shall be submitted to the Engineer. The material shall conform to the job mix formula within the following tolerances for acceptance:

4.75mm (No. 4) and larger sieves	+/- 7 percent
Passing 4.75mm (No.4) to 0.15mm (No.100) sieves	+/- 5 percent
Passing 0.15mm (No.100) and smaller sieves	+/- 3 percent
Asphalt content	+/- 0.4 percent

Asphalt binder will be accepted by manufacturer's certification using form ITD-966.

Plant mix pavement density acceptance will be by visual observation. The Engineer will observe the contractor's compaction operation and document equipment and compaction effort.

B. Aggregate Base. The aggregate base will be accepted by certification using form ITD-851. The contractor shall submit quality control test results for each 1000 tons of aggregate base placed, with a minimum of one test per project, indicating gradation (AASHTO T-27 with no wash required) and sand equivalent (AASHTO T-176) to verify the certification. The quality control sampling and testing shall be performed by a qualified independent laboratory and shall be submitted to the Engineer. The material shall conform to one of the specified base gradations for acceptance.

Aggregate base density acceptance will be by visual observation. The Engineer will observe the contractor's compaction operation and document equipment and compaction effort.

The Engineer may elect to sample and test the aggregate base to verify the certifications. Should sampling and testing indicate material not meeting specification; the materials shall be subject to rejection. The Engineer may allow non-specification material to be left in place with a price adjustment if the finished product is found to be capable of performing its intended purpose. The price adjustment will be 75 percent of the contract unit bid price multiplied by the total quantity of aggregate base represented by the failing test results.

Independent assurance sampling and testing will not be required.

Method of Measurement. Plant mix for Shared-use Path will be measured in accordance with Subsection 405.04. Aggregate Base for Shared-use Path will be measured in accordance with Subsection 303.04.

Basis of Payment. Payment for accepted work will be as follows:

Pay Item	**Pay Unit**
S637-10A & 11A Aggregate Base for Shared-use Path……	Ton or CY
S637-15A Plant mix for Shared-use Path……...……	Ton

Plant mix for Shared-use Path shall be full compensation for this item. No separate payment will be made for asphalt and additives.

All other work and material shall be incidental unless provided for under other items in the contract.

Stormwater Pollution Prevention Plan

For:

DeSmet - Tensed Trail

Contractor:

To be determined by competitive bid – July 2009

SWPPP Preparation Date:

June 22, 2009

Estimated Construction Date: Summer 2009

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App C – BMP specifications and details 27

SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING

1.1 Project/Site Information

Project Information:

Project/Site Name: DeSmet-Tensed Trail

County and State: Benewah County, Idaho

Location Description: The proposed DeSmet-Tensed Trail is located west of US Highway-95 between the communities of DeSmet, Idaho and Tensed, Idaho. The trail will generally run north-south from the Tensed City Park at the north end, to DeSmet Road at the south end.

Latitude/Longitude (Use **one** of three possible formats, and specify method)

Latitude:	Longitude:
1. 47 º 09 ' 25 " N (degrees, minutes, seconds)	1. 116 º 31 ' 26 " W (degrees, minutes, seconds)

Method for determining latitude/longitude:

☐ USGS topographic map (specify scale: _____) ☐ EPA Web site ☒ GPS

☐ Other (please specify): _____

Is the project located in Indian country? ☒ Yes ☐ No

If yes, name of Reservation, or if not part of a Reservation, indicate "not applicable."
Coeur d'Alene Reservation

Is this project considered a federal facility? ☐ Yes ☒ No

1.2 Contact Information/Responsible Parties

Project Information:

Owner:
Coeur d'Alene Tribe
Lake Management Department
401 Anne Antelope Rd
Plummer, ID 83851
ph: (208) 686-5302
fx: (208) 686-7221

Construction Contractor:
TBD

This SWPPP Was Prepared By:
TerraGraphics Environmental Engineering, Inc.
108 W Idaho Ave
Kellogg, ID 83837
ph: (208) 786-1206
fx: (208) 786-1209

Emergency contact:
Coeur d'Alene Tribe, Lake Management Department
Dave Lamb, Lake Ecologist
ph: (208) 686-6206
dlamb@cdatribe-nsn.gov

1.3 Nature and Sequence of Construction Activity

Project Information:

- Describe the general scope of the work for the project, major phases of construction, etc:

The DeSmet – Tensed Trail construction consists of installing approximately 3,000 feet of 9-foot wide asphalt paved surface trail, with a crushed aggregate base. The trail will be installed at grade, requiring that approximately 1-foot of native material will be excavated from the trail corridor and replaced with the crushed aggregate base material. The excavated material will be

disposed of at the Tensed City Park. In addition to the trail construction, the project also includes the installation of a 100-foot span prefabricated steel truss bridge over Hangman Creek.

What is the function of the construction activity?

☐ Residential ☐ Commercial ☐ Industrial ☐ Road Construction

☐ Linear Utility

☒ Other (please specify): Shared-use bicycle/pedestrian path

Estimated Project Start Date: Late Summer 2009

Estimated Project Phase Completion Date: Fall 2009

1.4 Soils, Slopes, Vegetation, and Current Drainage Patterns

Project Information:

Soil type(s):

- The existing soils consist of approximately 1.5 feet of topsoil, described as dark brown silt with a high organic content. Beneath the topsoil is alluvium consisting of silt with sand to a depth of approximately 8 feet.

Slopes (describe current slopes and note any changes due to grading or fill activities):

- Project site is relatively flat with some rolling hills ranging in elevation from 2545' to 2560' above MSL.
- The proposed trail will be at-grade, thus no significant grading activities are anticipated.

Drainage Patterns (describe current drainage patterns and note any changes dues to grading or fill activities): (See Appendix B for map of existing drainage features)

- The existing drainage patterns of the site are typical of relatively flat agricultural lands in the surrounding area. Streams have been altered from their natural channel by agricultural activities. The project site generally drains to local low areas, and ultimately to Hangman Creek via flat, slow-flowing channels, or through infiltration.

Vegetation:

- Vegetation found along the project site consists of agricultural crops including wheat and blue grass. The riparian area immediately adjacent to Hangman Creek is vegetated with grass (primarily Reeds Canary Grass, see Figure 6). The floodplain area adjacent to the creek channel is vegetated with a combination of Reeds Canary grass and weeds (primarily Common Tansy).

1.5 Construction Site Estimates

Project Information:

The following are estimates of the construction site:

Construction Site Area including trail footprint and disposal site:	1 acre
Total Project Area	1.4 acres
Percentage impervious area before construction	0 %
Runoff coefficient before construction	0.45
(agricultural crops on silty soil)	
Estimated runoff during 25 year 24-hour event (2.5in)	5717 ft^3
Percentage impervious area after construction	0 %
Runoff coefficient after construction	0.69
(composite for paved, vegetated, and gravel areas)	
Estimated runoff during 25 year 24-hour event (2.5in)	8766 ft^3

1.6 Receiving Waters

Project Information:

Description of receiving waters:	Hangman Creek
Description of storm sewer systems:	none

Description of impaired waters or waters subject to total maximum daily loads (TMDLs):
Hangman Creek is considered impaired for bacteria, habitat alteration, nutrients, and sediment.

1.7 Site Features and Sensitive Areas to be Protected

Project Information:

Description of sensitive features and measures to protect them:

The sensitive site feature for the project is primarily Hangman Creek. Construction activities will be in close proximity to Hangman Creek during the bridge installation. Construction is expected to occur in late summer or early fall when water levels in the stream are lowest. This will provide the maximum possible buffer zone between construction activities and the active stream channel, and will also minimize necessary dewatering of excavation for the bridge

foundation. Sediment control BMPs, such as straw wattles, will be utilized at the bridge installation site to prevent sediment discharge into Hangman Creek.

1.8 Potential Sources of Pollution

Project Information:

Potential sources of sediment to stormwater runoff:

- Erosion of sediment from areas within the clearing limits.

Potential pollutants and sources, other than sediment, to stormwater runoff:

- Hydrocarbons/oil and grease from vehicle or equipment fluid leaks.
- Sanitary/septic waste from portable toilet.

1.9 Endangered Species Certification

Project Information:

Are endangered or threatened species and critical habitats on or near the project area?

☐ Yes ☒ No

Describe how this determination was made:

The Tribe contacted USFWS as part of the Environmental Assessment for the project. The Endangered Species Act consultation concluded that no listed species are present within the project area.

1.10 Historic Preservation

Project Information:

Are there any historic sites on or near the construction site?

☐ Yes ☒ No

- Several historic sites associated with early Catholic missions are located within the community of DeSmet, but none are within or adjacent to the project site.

If yes, describe or refer to documentation which determines the likelihood of an impact on this historic site and the steps taken to address that impact.

1.11 Maps

Project Information:

A site location map showing the project vicinity and trail location is included on the cover sheet of the plans in the contract documents.

SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

Project Information:

2.1 Minimize Disturbed Area and Protect Natural Features and Soil:

- Clearing and grubbing will be limited to the footprint of the trail and shoulder. Existing vegetation within the trail right-of-way outside the footprint of the trail will generally be left in place during construction to provide a buffer zone between the construction activities and the surrounding areas. Permanent vegetation in the form of native shrubs and plants is anticipated to be installed by the owner along the edge of the trail some time after construction.

- Construction Sequencing: Construction activities will take place in late summer/early fall to coincide with lowest water levels on Hangman Creek. The construction area should be dry during this time, and this will minimize the need for dewatering for the bridge foundation excavation.

2.2 Control Stormwater Flowing Onto and Through the Project:

Describe structural practices (i.e., diversions, berms, ditches, storage basins) including design specifications and details used to divert flows from exposed soils, retain or detain flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. (See SWPPP Guide, Chapter 4, ESC Principle 3 for more information.)

- Minimal stormwater runon occurs at the project site due to the relatively flat surrounding terrain. Some flow through the site in the channel near the south end of the trail might be expected in a high rainfall event.

2.3 Stabilize Soils:

Describe controls (i.e., temporary seeding with native vegetation, hydroseeding, etc.) to stabilize exposed soils where construction activities have temporarily or permanently ceased. Also describe measures to control dust generation. Use of impervious surfaces for stabilization should be avoided whenever possible. (See SWPPP Guide, Chapter 4, ESC Principle 4 for more information.)

Not Used.

2.4 Protect Slopes:

Describe controls (i.e., erosion control blankets, tackifiers, etc.) including design specifications and details that will be implemented to protect all slopes. (See SWPPP Guide, Chapter 4, ESC Principle 5 for more information.)

- BMP Description: The slopes for the bridge approaches will be covered with erosion control blankets.

  ☐ Permanent ☒ Temporary

- Installation Schedule: Erosion control blankets shall be installed after fill material is placed for the bridge approaches and the slope grading is complete.

- Maintenance and Inspection: Erosion control blankets and slopes will be inspected prior to forecasted rain events, and after storms. Blankets will be checked to ensure proper contact with the soil is maintained, the blanket has no tears or holes, and that it remains properly anchored.

- Responsible Staff: Construction Contractor

- BMP Description: Slopes for other fill areas along the trail, such as approaches to culverts, will be covered with crushed rock to prevent erosion of the fill soil.

  ☒ Permanent ☐ Temporary

- Installation Schedule: Aggregate material will be placed on the slope after other fill material is placed, as the base material for the trail is placed and compacted.
- Maintenance and Inspection: Slopes should be inspected prior to forecasted rain events and after storms to ensure that the aggregate materials remain in place and no active erosion is occurring.
- Responsible Staff: Construction Contractor

2.5 Protect Storm Drain Inlets:

Describe controls (i.e., inserts, rock-filled bags, or block and gravel, etc.) including design specifications and details that will be implemented to protect all inlets receiving stormwater from the project during the entire duration of the project. (See SWPPP Guide, Chapter 4, ESC Principle 6 for more information.)

- Not Applicable

2.6 Establish perimeter controls and sediment barriers:

Describe structural practices (i.e., silt fences or fiber rolls) including design specifications and details to filter and trap sediment before it leaves the construction site. (See SWPPP Guide, Chapter 4, ESC Principle 7 for more information.)

- BMP Description: Fiber rolls will be placed above the Hangman Creek Channel at each abutment foundation. Fiber rolls will also be placed across existing low areas/ditches at each edge of the trail right-of-way to capture sediment from runon/runoff in the ditches.
- Installation Schedule: Prior to excavating for bridge foundation.
- Maintenance and Inspection: Inspect fiber rolls prior to forecasted rain events and after storms. Check for undercutting, tears, splits, or unraveling. Sediment accumulation behind the rolls should be monitored during inspections. Remove sediment or place additional rolls if sediment buildup is near the top of the roll.
- Responsible Staff: Construction Contractor

2.7 Retain Sediment On-Site and Control Dewatering Practices:

Describe sediment control practices (i.e., sediment trap or sediment basin), including design specifications and details (volume, dimensions, outlet structure) that will be implemented at the construction site to retain sediments on-site. Describe dewatering practices that will be implemented if water must be removed from an area so that construction activity can continue. (See SWPPP Guide, Chapter 4, ESC Principle 8 for more information.)

- BMP Description: While not anticipated, if dewatering is required during the excavation of the bridge foundation, detention, land application, or other practiced must be utilized to ensure no water from excavation area is discharged directly into Hangman Creek.
- Installation Schedule: As necessary during excavation for bridge foundation.
- Maintenance and Inspection: Maintain pumps, hoses, and fittings as necessary for dewatering to maintain dry excavation area. Monitor during use to ensure no water from the excavation area is directly discharged into Hangman Creek.
- Responsible Staff: Construction Contractor

2.8 Establish Stabilized Construction Exits:

Describe location(s) of vehicle entrance(s) and exit(s), procedures to remove accumulated sediment off-site (i.e., vehicle tracking), and stabilization practices (i.e., stone pads and/or wash racks) to minimize off-site vehicle tracking of sediments and discharges to stormwater. (See SWPPP Guide, Chapter 4, ESC Principle 9 for more information.)

- BMP Description: Construction site entrances will be constructed at each end of the trail. Coarse aggregate will be placed at each of these locations to provide stabilization and minimize tracking of sediment on and off site.
- Installation Schedule: Construction entrance/exits will be placed prior to any clearing or excavation activities.
- Maintenance and Inspection: Inspections of the site entrances/exits will be conducted weekly during construction to ensure that no sediment is tracked onto public roads.
- Responsible Staff: Construction Contractor

SECTION 3: GOOD HOUSEKEEPING BMPS

3.1 Good Housekeeping BMPs

Instructions:

- Describe the key good housekeeping and pollution prevention (P2) measures that will be implemented to control pollutants in stormwater.
- Categorize each good housekeeping and pollution prevention (P2) BMP under one of the following 7 categories and follow the instructions to SWPPP Guide your description:

  ☐ ***Material Handling and Waste Management:***
  ☐ ***Establish Proper Building Material Staging Areas:***
  ☐ ***Designate Washout Areas:***
  ☐ ***Establish proper equipment/vehicle fueling and maintenance practices:***
  ☐ ***Allowable non-stormwater discharges and control equipment/vehicle washing:***
  ☐ ***Spill Prevention and Control Plan:***
  ☐ ***Any Additional BMPs:***

- For more information, see SWPPP Guide, Chapter 5.
- Consult your state's design manual or resources in Appendix D of the SWPPP Guide.
- For more information or ideas on BMPs, see EPA's National Menu of BMPs http://www.epa.gov/npdes/stormwater/menuofbmps

Project Information:

1. Material Handling and Waste Management:

Describe measures (i.e., trash disposal, sanitary wastes, recycling, and proper material handling) to prevent the discharge of solid materials to waters of the U.S., except as authorized by a permit issued under section 404 of the CWA. (See SWPPP Guide, Chapter 5, P2 Principle 1)

- BMP Description: All trash or other solid waste material must be disposed of off site by the contractor.
- Installation Schedule: Entire construction period.
- Maintenance and Inspection: Keep construction site clean and free of trash or debris. General cleanup of any trash or waste generated on site should be conducted at the end of each work day.
- Responsible Staff: Construction Contractor

2. Establish Proper Building Material Staging Areas:

Describe construction materials expected to be stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater. (See SWPPP Guide, Chapter 5, P2 Principle 2 for more information.)

Construction materials consist of geotextile fabric, crushed aggregates for trail base material, asphalt for trail surfacing, prefabricated 100' span steel truss bridge, and concrete for the bridge abutments. Storage of materials on site for extended periods of time is not anticipated. Temporary stock piles of aggregates will likely occur within the trail right-of-way as material is placed.

- BMP Description: Stock piles will be covered with tarps or other suitable fabric to prevent wind and raindrop erosion. The perimeter of any stock pile will be protected with silt fence, fiber roll, gravel bags, or sand bags.
- Installation Schedule: These BMPs will be installed for any stockpile to remain inactive for a period longer than 7 days, or prior to anticipated rainfall events.
- Maintenance and Inspection: Inspector will monitor stock piles during regular inspections to ensure material is not actively eroding from the stock pile area.
- Responsible Staff: Construction Contractor

3. Designate Washout Areas:

Describe location(s) and controls to minimize the potential for stormwater pollution from washout areas for concrete mixers, paint, stucco, etc. (See SWPPP Guide, Chapter 5, P2 Principle 3 for more information.)

- Not anticipated.

4. Establish proper equipment/vehicle fueling and maintenance practices:

Describe equipment/vehicle fueling and maintenance practices that will be implemented to control pollutants to stormwater (e.g., secondary containment, drip pans, spill kits, etc.) (See SWPPP Guide, Chapter 5, P2 Principle 4 for more information.)

- BMP Description: Equipment will be inspected daily during equipment operation to ensure it is operating normally and without fluid drips or leaks. Spill kit will be kept on site to contain and collect spilled materials for disposal when necessary. If equipment leaks are common, daily drip pans will be placed underneath equipment after equipment is shutdown at the end of each day.
- Installation Schedule: N/A
- Maintenance and Inspection: Each use of the equipment
- Responsible Staff: Construction Contractor

5. Allowable non-stormwater discharges and control equipment/vehicle washing:

For the allowable non-stormwater discharge(s) associated with construction industrial activity identified, describe controls and measures that will be implemented at those sites to minimize pollutant discharges. (See SWPPP Guide, Chapter 5, P2 Principle 5 for more information.)

- Not anticipated.

6. Any Additional BMPs:

Describe any additional BMPs that don't fit into the above categories. Indicate the problem they are intended to address.

3.2 Allowable Non-Stormwater Discharge Management

Project Information:

List allowable non-stormwater discharges and the measures used to eliminate or reduce them and to prevent them from becoming contaminated:

- Not anticipated.

SECTION 4: SELECTING POST-CONSTRUCTION BMPs

Project Information:

Long term erosion control measures will be maintained by the Owner after construction. This is anticipated to include planting of native vegetation along the trail corridor, and regular inspections of culverts and the bridge over Hangman Creek.

SECTION 5: INSPECTIONS AND MAINTENANCE

5.1 Inspections

Project Information:

1. Inspection Personnel:

Identify the person(s) who will be responsible for conducting inspections and describe their qualifications.

- Construction Contractor – Personnel to be determined.

2. Inspection Schedule and Procedures:

i. Describe the inspection schedules and procedures you have developed for your site (include frequency of inspections for each BMP or group of BMPs, indicate when you will inspect, e.g. before/during/and after rain events, spot inspections, etc.).

- General inspection schedule is as described for each BMP in the previous section. At a minimum, BMPs will be inspected prior to forecast rainfall events and after storms.

ii. Describe the general procedures for correcting problems when they are identified. Include responsible staff and timeframes for making corrections.

- The Construction Contractor shall oversee implementation of all necessary repairs and modifications to BMPs and the SWPPP.

iii. Attach a copy of the inspection report you will use for your site.

- Inspection Report is attached in Appendix A.

5.2 Maintenance of Controls

Instructions:

- Summarize routine maintenance of structural and non-structural BMPs. Include schedules (daily, weekly, etc.) as well as the staff responsible.
- Maintenance procedures for individual BMPs should be included in Section 2 and 3.
- Specific maintenance activities can be documented in the corrective action log described below in Section 5.3.
- For more on this topic, see SWPPP Guide, Chapters 4 and 5 and the suggestions on the Sample Inspection Report in Appendix B.

Project Information:

Maintenance Procedures: Maintenance activities for each BMP will occur based on items identified during regular inspections as indicated in sections 2 and 3 above.

5.3 Corrective Action Log

Instructions:

- Create here, or as an attachment, a corrective action log. This log should describe repair, replacement, and maintenance of BMPs undertaken based on the inspections and maintenance procedures described above. Actions related to the findings of inspections should reference the specific inspection report.
- This log should describe actions taken, date completed, and note the person that completed the work.

Project Information:

Corrective Action Log:

DATE of REPAIR	BMP AFFECTED	DESCRIPTION OF REPAIR ACTIONS

SECTION 6: RECORDKEEPING AND TRAINING

6.1 Recordkeeping

Instructions:

The following is a list of records you should keep at your project site available for inspectors to review:

- Dates of grading, construction activity, (and stabilization which is covered in Section 7).
- Inspection reports (attach).

Project Information:

Dates when construction activities temporarily or permanently cease on a portion of the site

DATE	NATURE OF SHUT DOWN	LIST OF BMPS IMPLEMENTED FOR TEMPORARY STABILIZATION

6.2 Log of Changes to the SWPPP

Instructions:

Create a log here, or as an attachment, of changes and updates to the SWPPP. You should include additions of new BMPs, replacement of failed BMPs, significant changes in the activities or their timing on the project, changes in personnel, changes in inspection and maintenance procedures, and updates to site maps, etc.

Project Information:

Log of changes and updates to the SWPPP:

DATE of CHANGE	AFFECTED SECTIONS of SWPPP	BRIEF DESCRIPTION OF CHANGES MADE

6.3 Training

Instructions:

- Training your staff and subcontractors is an effective BMP. As with the other steps you take to prevent stormwater problems at your site, you should document the training that you conduct for your staff, for those with specific stormwater responsibilities (e.g. installing, inspecting, and maintaining BMPs), and for subcontractors.

Project Information:

- The Construction Contractor will be familiar with the SWPPP and proper utilization of the BMPs.

SECTION 7: FINAL STABILIZATION

Project Information:

- Final stabilization will be achieved through a combination of permanent and temporary BMPs installed as part of the trail design, such as erosion control blankets, riprap, and crushed rock, and through re establishing native vegetation along the trail corridor, which is expected to be conducted by the Tribe some time after construction is complete.

SECTION 8: CERTIFICATION AND NOTIFICATION

Instructions:

- The SWPPP should be signed and certified by the owner and construction operator(s).

Project Information:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner (Idaho Department of Environmental Quality)

Name: _____ Title: _____

Signature: _____ Date: _____

Operator

Name: _____ Title: _____

Signature: _____ Date: _____

SWPPP APPENDICES

App A – Inspection Reports

SWPPP Inspection Summary
DeSmet-Tensed Trail Project

Date/time of inspection:
Name/title of inspector:
Weather during this inspection period:
Any evidence of off-site discharge of sediment or pollutants:
Location of any off-site discharge of sediment or pollutants:
Location of BMPs that need to be maintained:
Location of BMPs that failed to operate as designed:
Location where additional BMPs are needed:
Observations of on-site drainage:
Recommended corrective actions:

App B – Subcontractor Certifications/Agreements

This page part of USEPA SWPPP Template

App C – BMP specifications and details

All Best Management Practices shall be installed as indicated in the design documents and Phase 1 Operations Plan. Standards and Specifications shall be as indicated in the *Catalog of Stormwater Best Management Practices for Idaho Cities and Counties* (Idaho Department of Environmental Quality, Water Quality Division, September 2005).

STRATA
GEOTECHNICAL ENGINEERING & MATERIALS TESTING
Integrity from the Ground Up

June 25, 2009
TERGRA M08064A

Mr. Derek Forseth, P.E.
TerraGraphics Environmental Engineering, Inc.
121 South Jackson Street
Moscow, Idaho 83843

RE: **LETTER ADDENDUM**
Geotechnical Engineering Evaluation
Proposed Pedestrian Bridge
DeSmet-Tensed Trail Project
Coeur d'Alene Indian Reservation
Benewah County, Idaho

Dear Derek:

Strata Geotechnical Engineering and Material Testing, Inc. (STRATA), is providing this letter addendum to our *Geotechnical Engineering Evaluation* dated August 22, 2009 for the proposed pedestrian bridge, which is part of the DeSmet-Tensed Trail project, located on the Coeur d'Alene Indian Reservation in Benewah County, Idaho. From our discussions with Mr. Dan McCracken, E.I.T. with Terragraphics Environmental Engineering, Inc. (Terragraphics), we understand structural loads for the bridge have increased due to project modifications since the publication of our geotechnical report. Also, comments received by Terragraphics from Mr. Gregory Brands, P.E. with the Idaho Transportation Department (ITD) required an additional evaluation of lateral load resistance for the planned bridge abutment. The requested additional evaluations were authorized via an addendum to our existing contract with Terrgraphics dated May 26, 2009. The following text summarizes the results of our additional evaluation. This letter supplements, but does not supercede our original report.

Revised Project Understanding

Based on information provided by Mr. McCracken with TerraGraphics, we understand the planned bridge will now have a total weight (live plus dead loads) of about 141 kips, or about 70.5 kips per abutment foundation. Also, the bridge will experience lateral loads of 21.6 kips due to wind loading, or about 10.8 kips per abutment. Mr. Brands with ITD has requested the bridge be designed to resist lateral loads without utilizing friction on the abutment pier cap bases.

Revised Foundation Design

Specific recommendations for steel helical pier foundations as well as typical specifications for piers are provided in our original report dated August 22, 2008. The results of our additional evaluation with respect to the revised structural loading conditions are provided below.

Helical Pier Foundations

Lateral Load Resistance

To resist the lateral abutment loads reported to us, we recommend additional helical piers be installed at a 45 degree angle to the horizontal, and connected to the abutment foundation. Based on the results of our subsurface exploration, test pier installation and revised project understanding, we estimate 2 battered piers be installed at each abutment, 1 on each abutment side as illustrated on the attached Plate 1, *Battered Pier Diagram.* Battered piers must be installed to achieve the minimum vertical embedment depth of 25 feet to the trailing helix required in our August 22, 2008 report. We estimate this will require each battered pier be 35 feet long to the trailing helix when installed with a 45 degree batter. Also, battered piers must achieve an installation torque of at least 4,000 foot-pounds prior to installation termination. All other recommendations regarding pier design and construction in our August 22, 2008 report apply to battered pier installation.

Battered helical piers will resist vertical axial loads as well as lateral loads. The following recommendations for vertical helical pier support of revised axial abutment loads incorporate vertical load carrying capacity of battered piers as well as vertical piers.

Vertical Load Resistance

Based on the revised structural loads provided to us, we recommend each abutment utilize 4 vertical helical piers (in addition to battered piers described above) for structural compressive load support, to facilitate the recommended factor of safety (FOS = 3.0). Based on the test pier installation results summarized in our August 22, 2008 report we anticipate vertical piers must be installed to a depth of 50 feet to achieve the recommended FOS. All other recommendations regarding pier design and construction in our August 22, 2008 report apply to battered pier installation.

Estimated Pier Settlement

We anticipate pier settlement will have 3 main components. These components are immediate (elastic) settlement, consolidation settlement, and secondary compression. Based on the revised structural loads, we estimate elastic and consolidation settlement will combine to be on the order of 1.5 inches total and 1 inch differential across the planned bridge structure. We estimate elastic settlement will be about 1/3 of the total settlement estimate summarized above, and will occur within a few months of completing the embankment. Also, we estimate about 85 percent of consolidation settlement is expected to occur within the first 2 years after embankment construction. These estimates are based on empirical correlations to soil index and other laboratory test results[1].

Long-term settlement associated with secondary compression of the elastic, organic silt is estimated to be on the order of 2.5 to 3.5 inches, in addition to the elastic and consolidation settlement estimates above. We estimate this settlement will occur slowly over the life of the structure, taken as 20 years. From our discussions with you, we understand the planned bridge will be able to accommodate

this settlement. We understand the bridge approaches will be paved, therefore periodic regrading and/or repaving at the abutment approaches may be required to help reduce pathway misalignment due to settlement. Also, since the in-situ consistency of anticipated bearing soil encountered during exploration is generally very stiff to hard, it appears pier buckling failure is unlikely.

Evaluation Limitations

This letter addendum has been prepared to assist the planning, design and construction of the proposed pedestrian bridge for the DeSmet-Tensed Trail project, located on the Coeur d'Alene Indian Reservation in Benewah County, Idaho. Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical principles and practices as they exist at the time and in the area of this project. The recommendations in this letter are based on information provided to us by Terragraphics, and the results of our previous geotechnical evaluation. Changes to the planned project from that described herein, and in our previous report may impact our recommendations. Maintaining geotechnical engineering continuity during construction can help reduce the potential for construction phase errors and omissions which can compromise the structure's performance. This acknowledgement is in lieu of all express or implied warranties.

We appreciate the opportunity to continue our service to Terragraphics Environmental Engineering, Inc. and the Coeur d'Alene Tribe on this project. Please contact us if you have any questions or comments.

Sincerely,
STRATA, Inc.

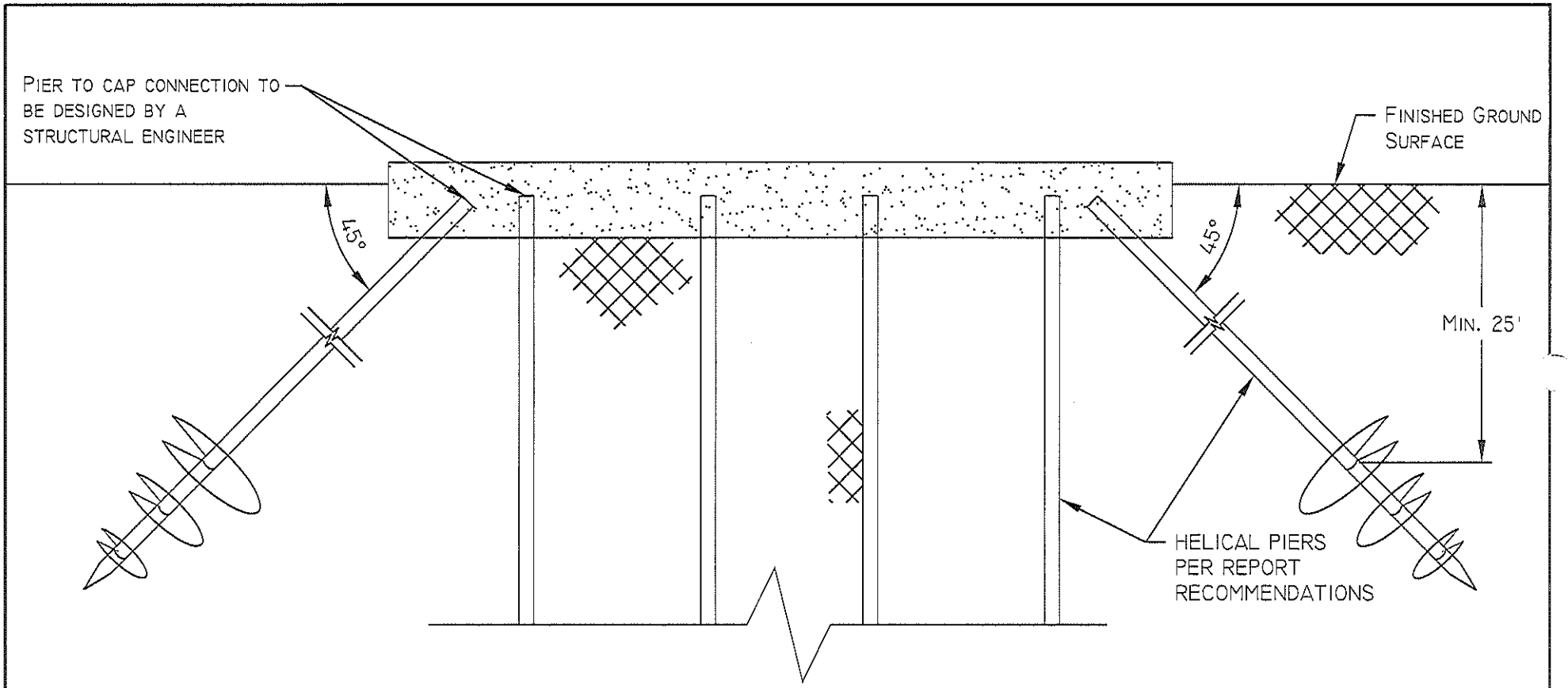
Andrew J. Abrams, P.E.
Project Engineer

PROFESSIONAL ENGINEER REGISTERED 12481 6/25/09 STATE OF IDAHO ANDREW J. ABRAMS

Travis J. Wambeke, P.E.
Principal Engineer

Plate 1 – Battered Pier Schematic

[1] Manual on Estimating Soil Properties for Foundation Design, Kulhawy, F.H., Mayne, P.W., Electric Power Research Institute (EPRI), Palo Alto, California, 1990.



NOTES: PIER CONSTRUCTION INSTALLATION DEPTH AND TORQUE REQUIREMENTS MUST BE ACHIEVED AS OUTLINED IN STRATA'S AUGUST 22, 2009 REPORT AND JUNE 22, 2009 LETTER ADDENDUM

BATTERED PIER SCHEMATIC

STRATA
GEOTECHNICAL ENGINEERING & MATERIALS TESTING
Integrity from the Ground Up

INFORMATIONAL ONLY (Not to Scale, Not for structural desigh).

REPORT
Geotechnical Engineering Evaluation
Proposed Pedestrian Bridge
DeSmet-Tensed Trail Project
Coeur d'Alene Indian Reservation
Benewah County, Idaho

PREPARED FOR:
Mr. Derek Forseth, P.E.
TerraGraphics Environmental Engineering, Inc.
121 South Jackson Street
Moscow, ID 83843

PREPARED BY:
STRATA, Inc.
1428 South Main Street
Moscow, Idaho 83843

August 21, 2008

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REPORT
Geotechnical Engineering Evaluation
Proposed Pedestrian Bridge
DeSmet-Tensed Trail Project
Coeur d'Alene Indian Reservation
Benewah County, Idaho

INTRODUCTION

STRATA Geotechnical Engineering and Materials Testing, Inc. (STRATA) has accomplished the authorized geotechnical engineering evaluation for the proposed pedestrian bridge crossing Hangman Creek between the towns of Tensed and DeSmet in Benewah County, Idaho. The approximate location of the project site is illustrated on Plate 1, *Site Plan*. The purpose of our geotechnical engineering evaluation was to explore subsurface conditions in the vicinity of the proposed pedestrian bridge crossing and provide geotechnical engineering recommendations to assist project planning, design and construction. The geotechnical engineering evaluation included the following scope of services:

1. Coordinated exploration with Dig Line and the Coeur d'Alene Tribe to help reduce damage to existing utilities.

2. Observed 1 boring in the vicinity of each abutment (2 borings total). Each boring was advanced to a depth of approximately 40 feet below the existing ground surface. The soil encountered in the borings were visually described and classified referencing the Unified Soil Classification System (USCS) and the soil profiles were logged. Soil samples were obtained for laboratory testing. Borings were backfilled with drill cuttings and received a bentonite plug at the surface.

3. Performed laboratory tests on select samples of soil from the site to assess natural moisture content and density, Atterberg limits, shear strength, consolidation potential, maximum dry density, optimum moisture content, pH and resistivity.

4. Performed engineering analyses in order to provide geotechnical design and construction recommendations for the proposed pedestrian bridge. Our engineering analyses provided geotechnical recommendations for:

   - Abutment site preparation
   - Soil excavation characteristics
   - Temporary construction slopes
   - Abutment structural fill placement
   - Wet weather construction
   - Lateral earth pressures for abutments
   - Foundation design criteria including vertical bearing and uplift capacity
   - Anticipated foundation settlement
   - Seismicity and peak ground acceleration
   - Soil corrosivity
   - Additional recommended services

5. Prepared and provided 4 copies of our report of geotechnical opinions and recommendations.

Based on our discussions with you and Mr. Dave Lamb with the Coeur d'Alene Tribe, our authorized geotechnical services for the project have been limited to providing recommendations for the planned pedestrian bridge crossing. Therefore, this report does not include recommendations for elements of pathway construction.

EXISTING SITE CONDITIONS

The site of the proposed bridge crossing is located on property owned by the Coeur d'Alene Indian Tribe to the west, the Benson family to the northeast and the Larson family to the southeast, as illustrated on Plate 1. Currently, no roads or other site developments exist in the immediate vicinity of the proposed pedestrian bridge. The existing ground surface in the vicinity of the proposed bridge is relatively flat and covered with various weeds, brush and grass. The banks of the Hangman Creek channel maintain moderate to steep inclinations ranging from about 3H:1V (horizontal to vertical) to more than 1H:1V. The elevation difference between the existing ground surface outside of the stream channel and the water level in Hangman Creek at the time of our exploration was approximately 8 to 9 feet.

PROPOSED CONSTRUCTION

Our understanding of the proposed construction is based on our discussions with you and our review of project documents, including a revised request for *Statement of Qualifications* dated March 31, 2008 and the scope of work for engineering services provided by the Coeur d'Alene Tribe. We understand the proposed pedestrian/bicycle trail will connect the City of Tensed with the community of DeSmet, within the Coeur d'Alene Indian Reservation in Benewah County, Idaho. The trail will have a total length of 3,115 feet, a width of 8 feet and will comprise a gravel surface. We understand significant grade changes are not planned for the trail construction and the planned trail will be at or slightly above existing grade. However, we anticipate relatively small fills will be required at the bridge approaches.

A light duty steel bridge is planned to cross Hangman Creek along the planned trail alignment. The approximate bridge dimensions are 100 feet long by 6 feet wide. Based on information provided by Mr. Dan McCracken, E.I.T. with TerraGraphics, we understand the planned bridge will have a total weight (live plus dead loads) of about 81 kips, or about 40.5 kips per abutment foundation.

SUBSURFACE EVALUATION PROCEDURES

Two exploratory borings were performed in the vicinity of the proposed pedestrian bridge. One boring was located in the vicinity of each bridge abutment. Boring locations were established

from existing site features referencing a preliminary site plan sketch provided by TerraGraphics on June 4, 2008. The approximate locations of our exploratory borings are illustrated on Plate 1. An engineer from our regional office observed and documented the subsurface exploration performed on June 17, 2008.

Borings were drilled using a truck-mounted 9600EC drill equipped with hollow-stem augers, a PowerProbe™ and standard soil excavation teeth. Borings were advanced to depths of about 40 feet below the existing ground surface. The soil profile encountered was logged and visually classified and described referencing the USCS.

Soil samples from borings were recovered at approximate 5-foot intervals and SPT N-values were recorded for each sample. A 2-inch-outside-diameter sampler obtained soil samples and SPT N-values. The samplers were advanced 18 inches with a 140-pound hammer falling 30 inches. The SPT N-value was obtained by counting the number of hammer blows required to advance the sampler over the interval from 6 to 18 inches. The blow counts for each 6-inch segment of the sampler are presented on the boring logs. The SPT N-values reported on the boring logs have not been corrected for overburden pressure or dilation effects on the sampler. In addition to SPT samples, 3-inch-diameter California Modified samplers were used to obtain relatively undisturbed soil samples. Three-inch-diameter sampler blow counts have been normalized to SPT N-values.

Each exploration was advanced about 26.5 to 40 feet below the existing ground surface using a PowerProbe™ to obtain relatively continuous samples of the subsurface soil profile. Borings were loosely backfilled at the completion of exploration, and received a bentonite plug at the surface.

In addition to the borings described above, STRATA observed the installation of a test helical pier on July 8, 2008 at the request of TerraGraphics. The test pier was installed in the vicinity of the north abutment to help estimate the axial capacity of helical piers that may be used to support the planned pedestrian bridge. The results of our observations are summarized below in Table 1.

Table 1. Test Helical Pier Results

Depth (ft)	# Pins	Torque(ft-lbs)	Ultimate Axial Capacity (kips)*
5	2	1,000	10
9	4	2,000	20
12	6	3,000	30
13	8	4,000	40
50	10	5,000	50

*A factor of safety must be applied to the ultimate capacity as described later in the report.

The following paragraphs summarize the subsurface conditions encountered in the locations explored. Detailed descriptions of the subsurface soil conditions are presented on individual boring

logs presented in Appendix A. The USCS is also included in Appendix A and can be used to identify terms and conditions described throughout this report and on exploration logs.

SUBSURFACE CONDITIONS

Topsoil was encountered at the ground surface in each exploration location, extending to about 1.5 feet below the existing ground surface. Topsoil was described as dark brown silt, which was soft, moist and contained vegetation and organic material. Beneath topsoil, alluvium consisting of silt with sand that was dark brown to grey with orange mottling, stiff to very stiff and moist to wet was encountered to a depth of approximately 8 feet below the existing ground surface. Below a depth of about 8 feet in each boring, alluvium was encountered consisting of sand with silt (in boring B-1) and silty gravel with sand (in boring B-2) that was dark to light grey, with reddish brown staining, very loose to medium dense, and wet. This coarse-grained alluvium extended to about 15.5 feet below the existing ground surface in each boring.

Beneath coarse-grained alluvium, fine-grained alluvium was encountered consisting of elastic/organic silt that was dark greenish-grey, stiff to very stiff and moist. Based on the results of laboratory testing, this soil maintains a high natural moisture content, low dry density, high plasticity and relatively high organic content. These soil properties will be discussed in more detail later in the report. This elastic/organic silt extended to the termination depth of each boring.

Groundwater was encountered in each exploration at approximately 8 feet below the existing ground surface. We anticipate groundwater levels in the vicinity of the proposed pedestrian bridge are influenced by the water level in Hangman Creek. Bedrock was not encountered within the depths or location explored.

Detailed descriptions of the subsurface conditions encountered in the exploratory boring are presented in Appendix A. The USCS is also presented in Appendix A and should be used to interpret the soil-related terms and descriptions throughout this report. Subsurface conditions may vary across the site. Such variation in subsurface conditions would not be apparent until construction. If the subsurface conditions observed during construction are different than those describe in this report, we should be provided the opportunity to review the actual subsurface conditions and revise our recommendations accordingly.

LABORATORY TESTING

Laboratory tests were performed with reference to ASTM procedures. Select soil samples obtained during exploration were tested to assess natural moisture content and dry density, Atterberg limits, shear strength, consolidation potential, maximum dry density, optimum moisture

content, organic content, pH and resistivity. The results of laboratory testing are included in Appendix B. The results of index tests are also included on the exploratory boring logs in Appendix A. Undisturbed samples for subsequent strength or consolidation testing were not obtained.

Index laboratory tests of the fine-grained alluvium encountered in each boring about 15.5 feet below the organic content indicated this soil is elastic/organic silt. Due to the organic content of this elastic silt, we anticipate it will be subject to secondary compression settlements due degradation of its organic constituents as they realize new load from the planned bridge. The impacts of secondary compression on the planned bridge are discussed in the *Foundation Design* section of this report.

GEOTECHNICAL OPINIONS AND RECOMMENDATIONS

The following recommendations have been prepared based on the results of subsurface exploration, field and laboratory testing, engineering analyses, correspondence with you and our understanding of the proposed construction as described in this report. If actual subsurface conditions differ from those encountered during exploration or if development plans change, we should be afforded an opportunity to update our opinions and recommendations.

Our exploration indicates loose, soft, saturated alluvial soil in the vicinity of the planned abutments extends to depths of more than 15 feet below the existing ground surface. Our analyses indicate bearing planned abutment foundations on this loose or soft near-surface soil will result in poor foundation support and settlement that is not acceptable to the planned structure. Removing soft alluvial soil beneath planned abutments, and replacing it with structural fill to improve foundation support may require shoring or bracing and dewatering or other specialized construction techniques. Prior to the publication of this report, we have discussed these difficult soil conditions and challenging construction characteristics with the design team. We also discussed several foundation alternatives including driven piles, intermediate soil improvements, and steel helical piers. Based upon these discussions, and STRATA's recommendations, the design team has selected steel helical piers for support of abutment foundations. Therefore subsequent sections of this report include geotechnical recommendations for steel helical pier foundations, as well as other aspects of the planned bridge construction.

Site Preparation

We recommend removing surficial soil containing vegetation and organics within the footprint of the proposed abutment locations prior to foundation construction. Soil containing vegetation or organic material should be stockpiled for use as landscaping material or removed from the site. We

anticipate topsoil stripping will extend about 18 inches below the existing ground surface. However, isolated thicker deposits of topsoil may be encountered and should also be removed.

Shaping and excavation will be necessary to prepare abutment locations prior to the installation of helical pier foundations and pier cap construction. Excavation to the base of pier caps will be required after pier installation and prior to the installation of concrete formwork for pier cap construction. Subgrade surface for pier caps should be prepared with a smooth blade to a smooth and undisturbed surface free of loose soil, debris and standing water.

Depending on the final bearing elevation of the pier cap, dewatering of the excavation may be required prior to placing concrete for pier caps. The contractor should coordinate pier installation operations with their schedule for cofferdams, dewatering, sump pumps and a rapid approach to earthwork and pier cap construction.

Excavation Characteristics/Dewatering

We anticipate conventional soil excavation equipment such as backhoes, excavators, bulldozers and loaders can be utilized for most earthwork on this project. Sloughing and caving of excavations deeper than about 3 feet or below the groundwater level should be anticipated. Due to the potential for groundwater in and adjacent to excavations, caving can occur rapidly and without warning. For this reason, we recommend the sides of temporary construction excavations be no steeper than 1.5H:1V (Horizontal to Vertical). Alternatively, trenches and excavations may be shored or braced. All excavations should be constructed in accordance with OSHA regulations and applicable local codes. The project contractor is solely responsible for site safety.

During construction of abutments or other site developments, contractors must be prepared for water entering excavations. Although possible at any depth, we expect infiltration will occur at or below the water elevation in Hangman Creek. We recommend the contractor maintain conventional sumps and pumps on site during all excavation, backfill placement and abutment construction. In addition, it may be necessary to operate pumps continuously to reduce saturation at subgrade and possible rework. The groundwater level should be lowered at least 2 feet below subgrade elevation, prior to placing concrete or structural fill. We anticipate this can be accomplished with conventional sumps and pumps appropriately established at the edge of foundations. However, it may be necessary to continuously operate pumps until abutment foundations are cast.

Structural Fill

Abutment backfill for this project must be granular soil classified as GW or GP per the USCS, with a fines content less than 10 percent by weight, such as 0.75 to 1.25 inch minus crushed basalt sand and gravel. Based on the results of exploration, we anticipate on-site material will not be

suitable for abutment backfill. Structural fill must be moisture conditioned, placed in loose horizontal lifts no thicker than 12 inches and compacted. This assumes large (10-ton) rollers are utilized. Smaller and lighter equipment must use a reduced lift thickness. Compaction of backfill within 3 feet of abutments should be performed only with vibratory plates and walk-behind compaction equipment to reduce the surcharge loading on abutments until the bridge deck is permanently fixed. Compaction of structural fill must achieve a minimum of 95 percent of the maximum dry density per ASTM D 1557 (Modified Proctor). In-place densities must be measured and documented by STRATA for all structural fill placed. Fill too coarse for density testing shall be compacted with 10-ton or larger equipment making at least 5 complete passes and reviewed by STRATA.

Imported coarse fill for use as abutment protection, or rip-rap, as well as backfill for bridge approaches, may also be necessary for construction. Civil and structural design must estimate the rip-rap thickness and material size requirements based on estimates of scour and stream velocity.

Wet Weather/Wet Soil Construction

We strongly recommend construction take place during dry weather conditions. If construction is performed during low stream flows, we anticipate the amount of water encountered in construction excavations may be reduced. It is our opinion the water encountered will likely be removed with conventional sumps and pumps prior to preparing foundations. Appropriate diversion structures should also be planned prior to construction.

If site construction is undertaken during wet periods of the year, the on-site alluvial soil will be susceptible to disturbance from heavy loads such as rubber-tired equipment or vehicles during construction. If construction commences before soil can dry after precipitation, or during wet periods of the year (October through June), earthwork should be completed by low pressure, track-mounted equipment that spreads and reduces the vehicle load. Work should not be performed immediately after rainfall or until soil can dry to below optimum moisture content. All soft, loose and disturbed soil should be recompacted, if possible, or removed and replaced with coarse, granular fill. When compacting granular fill for replacement of loose or disturbed soil, the initial lift of fill should be at least 12, but not greater than 18, inches in thickness. During construction, runoff from precipitation and the creek channel should be temporarily intersected and diverted to help prevent ponding of water on the project site and prepared subgrades.

STRATA should be present at the time of excavation and subgrade preparation to verify that no soft or pumping areas exist before placing structural fill or footings. We anticipate moist or wet conditions may be encountered during foundation excavation and subgrade preparation. The contractor should expect these conditions and be equipped to replace wet or disturbed soil with granular structural fill.

Once the subgrade is achieved, it is the contractor's responsibility to protect the soil from degrading under construction traffic and/or wet weather. The condition of the subgrade and careful construction procedures are critical to foundation stability and the long-term performance of the structure.

Foundation Design

We recommend steel helical pier foundations be embedded in the stiff to very stiff alluvial silt encountered at depth in our borings. Specific recommendations for steel helical pier foundations as well as typical specifications for piers are provided in subsequent sections of this report. Some general considerations and design criteria for pier cap and abutment foundation design and construction are also provided below.

General

The scour depth of Hangman Creek in the vicinity of the proposed bridge is unknown at this time. To reduce the potential for impacting foundation performance, we recommend soil surrounding pier caps and abutments be armored with rip-rap to reduce the potential for erosion or scour or embedded at least 3 feet below the design scour depth. Civil and structural design should estimate the rip-rap thickness and material size requirements based on estimates of scour and stream velocity.

We do not recommend piers be relied on for resistance of lateral loads. Lateral loads may be resisted by friction on the base of the pier cap. For concrete cast directly on native soil, we recommend a friction coefficient of 0.3 be used to resist lateral loads. We recommend STRATA be retained to observe all foundation construction including installation of helical piers, construction of pier caps and placing concrete. Helical pier construction requires design interpretation and testing performed during installation. Providing geotechnical design continuity through specialized foundation construction such as this is an important part of the design process.

Helical Pier Foundations

For our analyses, we used the guidelines provided by A.B. Chance® for helical pier systems. Based on our field and laboratory test results and subsequent engineering analyses, we estimate SS-5, 8-10-12 triple helix piers can achieve an ultimate axial capacity of 50 kips in the stiff alluvial silt encountered at depth beneath the planned abutments. Also, each pier can achieve an ultimate uplift resistance of 30 kips for resistance of uplift loads. Piers must extend to a minimum depth of 25 feet, and achieve the axial capacity required by structural design. It must be understood that the test pier installed at the site extended 50 feet to achieve an ultimate axial capacity of 50 kips. Structural design must evaluate the pier configuration with respect to the likely depths of installation.

We recommend structural design provide individual pier capacities on the foundation drawings with a factor of safety equal to at least 3.0 on the ultimate axial pier capacity (both compression and uplift). Structural design must also consider the actual span between piers with respect to the foundation reinforcing and load conditions. Pier to pier cap connections must be designed by a licensed structural engineer. We recommend each abutment utilize 3 piers for support of planned structural loads, to facilitate the recommended FOS, and improve flexural foundation stiffness. Based on the test installation results summarized above, we anticipate piers must be installed to a depth of 50 feet to achieve the recommended FOS.

Piers must be installed with minimum SS-5, 8-10-12-inch-diameter, triple-helix configurations. Helical piers will have a radius of influence of 3 times their diameter or approximately 30 inches from the center shaft. Therefore, piers should be spaced at least 30 inches on center for column caps to help reduce load interaction and reductions to group capacity. Once structural design is complete, we recommend the structural engineer supply STRATA with the anticipated helical pier configuration layout and the expected load for each pier to identify the potential for reduced capacity associated with load envelope overlap.

We anticipate pier settlement will have 3 main components. These components are immediate (elastic) settlement, consolidation settlement, and secondary compression. We estimate elastic and consolidation settlement will combine to be on the order of 1 inch total and ¾ inch differential across the planned bridge structure. We estimate elastic settlement will be about 1/3 of the total settlement estimate summarized above, and will occur within a few months of completing the embankment. Also, we estimate about 85 percent of consolidation settlement is expected to occur within the first 2 years after embankment construction. These estimates are based on empirical correlations to soil index and other laboratory test results[1].

Long-term settlement associated with secondary compression of the elastic, organic silt is estimated to be on the order of 2 to 3 inches, in addition to the elastic and consolidation settlement estimates above. We estimate this settlement will occur slowly over the life of the structure, taken as 20 years. From our discussions with you, we understand the planned bridge will be able to accommodate this settlement. Since the bridge approaches will not be paved, it is our opinion the extent of settlement at abutment approaches will not be noticeable providing annual maintenance is accomplished at the gravel surface. Since the in-situ consistency of anticipated bearing soil encountered during exploration is generally very stiff to hard, it appears pier buckling failure is unlikely.

[1] Manual on Estimating Soil Properties for Foundation Design, Kulhawy, F.H., Mayne, P.W., Electric Power Research Institute (EPRI), Palo Alto, California, 1990.

STRATA and the project structural engineer should review the pier contractor's installation plan, equipment, any proposed alternate materials and the proposed configuration prior to initiating construction. The contractor shall have equipment and materials available at the time of installation to achieve the design capacity of each pier through additional helices or extending additional depth. We recommend construction documents allow some flexibility and provide some contingencies since the final number and location of piers may vary somewhat from the planned design. Varying subsurface conditions can require different overall quantities, locations and/or depths of the piers. In our opinion, it is reasonable to expect contractors' bid items to cover costs within 10 percent of the quantities of piers estimated by TerraGraphics, based on structural design requirements. A. B. Chance piers are manufactured by IMR, Inc. We recommend IMR, Inc. review our design and qualify the contractor prior to allowing construction. Torque measurements on each pier, and a load test on 1 pier must be performed at the time of construction in accordance with the construction specifications outlined in Appendix C.

Abutment Lateral Earth Pressures

Soil retained by bridge abutments will cause a lateral earth pressure that must be resisted by the structure. Abutments should be designed to resist lateral soil pressures and surcharge pressures generated from surface traffic or other external loads. We recommend lateral earth pressures for abutment walls be estimated using the following equivalent fluid pressures (EFP) from Table 2 below. We have provided unfactored estimates of EFPs for imported granular backfill. Table 2 also includes EFPs for saturated backfill conditions to reflect flood events. If shotrock or other types of fill are used as abutment backfill, STRATA should review our EFP estimates to verify they remain appropriate.

Table 2. Static Equivalent Fluid Pressures (EFP)

Coarse gravel backfill (Φ= 37°)- Above groundwater level

Rankine Lateral Earth Pressure Case	EFP
At rest case (no wall movement)	55 pcf
Active case (wall movement away from soil mass)	35 pcf
Passive case (wall movement toward soil mass)	500 pcf*

*Requires at least ¾-inch lateral movement to mobilize full passive resistance

Coarse gravel backfill (Φ= 37°) – Below groundwater level

Saturated Rankine Lateral Earth Pressure Case	EFP
At rest case (no wall movement)	90 pcf
Active case (wall movement away from soil mass)	65 pcf
Passive case (wall movement toward soil mass)	300 pcf*

*Requires at least ¾-inch lateral movement to mobilize full passive resistance

Passive resistance values along pile caps can only be used if conventional abutment foundations are embedded at least 3 feet below scour depth. The lateral earth pressure coefficient of 0.5 can be used to estimate the lateral earth pressure induced on abutments due to adjacent surcharges caused by traffic loads. The unsaturated pressures presented above are based on drained conditions behind the bridge abutments. Drained conditions above the groundwater table can be achieved by backfilling with free draining granular soil with less than 5 percent passing the No. 200 sieve as illustrated on Plate 2, *Foundation/Wall Drainage Schematic.*

Corrosion Potential

The native alluvial clay at the site maintains a slightly alkaline pH (7.6) and laboratory resistivity test results (387 ohm-cm) suggest underground structures will be subjected to a severe corrosion environment. Therefore, structural design and selection of helical pier size must account for some potential loss of steel thickness due to corrosion. A CALTRANS method for estimating underground corrosion rates suggests a range of steel loss between 1.0 and 1.5 oz. per square foot (psf) per year (oz/ft^2/yr, weight loss rate).

The potential for corrosive activity is reduced when the pier is below the water table. A consistent, perched water table is expected within 6-8 feet below the existing ground surface in the area where helical pier foundations are expected. Our experience suggests that if corrosion loss is a factor in the life of a pier system, it is more efficient to size the piers slightly larger than to attempt exterior protection such as epoxy paint or greasing sidewalls. Additional factors should be considered with respect to corrosivity and the life of the foundation system including, but not limited to the anticipated useful life of the structure, and the risks of failure due to corrosion of helical pier foundations.

Concrete reinforcing steel should maintain appropriate IBC earth and form clearances at all times. Where possible, reinforcing steel should be positioned with the maximum available clearance that still meets structural design. Steel connection points to bridge deck, abutment or footing components should be adequately protected from corrosion with epoxy paint or other measures when in contact with soil. Epoxy paint, cathodic protection or other measures may be warranted to reduce corrosion of the pier section and reinforcing steel.

Our experience in the project vicinity and with regional concrete suppliers indicates the site soil will not significantly react with concrete products produced in the area. However, mix designs should be submitted with the appropriate testing to verify that aggregates and cement meet the standards of ACI, ASTM and the Idaho Transportation Department (ITD).

Seismicity and Liquefaction Potential

We expect the 2003 International Building Code (IBC) will be utilized for project structural design. Section 1615.1 of the 2003 IBC outlines the procedure for evaluating site ground motions and design spectral response accelerations. STRATA utilized site soil and geologic data and the project location to estimate earthquake loading criteria at the site referencing Section 1615.1 of the 2006 IBC. Based on our field exploration and knowledge of the upper 100 feet of the soil profile, we recommend a Site Class D be utilized as a basis for structural seismic design.

The National Seismic Hazard Maps (Frankel, et al., 1996) published by the *U.S. Geological Survey* (USGS) were referenced for probabilistic-based, peak ground accelerations anticipated at the project site. Peak ground accelerations (PGA) published by the USGS for 10 and 2 percent probability of exceedence in 50 years are presented below in Table 3.

Table 3. USGS Spectral Response Accelerations for Tensed, Idaho

Type of Acceleration	Probability of Exceedence in 50 years	
	10 Percent (500 years)[1]	2 Percent (2,500 years)[1]
PGA	0.06g[2]	0.13g[2]

[1]Indicates approximate return period of seismic event.
[2]Values are listed as a fraction of earth's gravitational acceleration, g

Liquefaction is a common concern in low-density, fine sand with a potential for saturated conditions. The liquefaction potential rapidly decreases when the density increases and the percentage of fine-grained soil increases. The sand with silt alluvium encountered in boring B-1 at about 8 feet below the existing ground surface was in a very loose, saturated condition during our exploration. We anticipate this soil may be subject to seismically induced deformation or liquefaction under certain conditions. Due to the density, and fines content of other soil encountered during exploration, we anticipate the liquefaction potential of these other soil is relatively low. A site specific seismic ground response study was not part of our authorized scope. If a more detailed evaluation of liquefaction is desired, please contact us for a revised scope of services.

ADDITIONAL RECOMMENDED SERVICES

Review of Plans and Specifications

We recommend that STRATA review the final plans and specifications for the project prior to issuing construction documents for bidding. It has been our experience that having consultants from

the design team review the construction documents prior to bidding helps reduce the potential for errors and also reduces costly changes to the contract during construction.

Construction Observation and Material Testing

We recommend that STRATA provide construction observation and material testing services for the project to document actual subsurface conditions match those encountered during exploration. These services are also important to provide you with confidence our geotechnical engineering recommendations are incorporated into project construction. If we are not retained to provide the recommended services, STRATA cannot be responsible for design and construction errors or omissions. The following presents STRATA's recommended minimum testing requirements:

- Subgrade: Visual observation of all subgrade preparations.
- Structural Fill: Minimum of 1 density and moisture test per 10,000 square feet, each lift or every 500 cubic yards.
- Finished Base: Minimum of 1 moisture and density test per 10,000 square feet.
- Structures: Minimum of 2 density and moisture tests per abutment pier cap, each lift.
- Laboratory: Minimum of 1 Modified Proctor Density Test (ASTM D 1557) per soil type with Atterberg Limits.

EVALUATION LIMITATIONS

This report has been prepared to assist the planning and design of the proposed bridge crossing Hangman Creek on property owned by the Coeur d'Alene Indian Tribe. Our services consisted of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices as they exist at the time and in the area of this report. The geotechnical recommendations provided herein are based on the premise that an adequate program of tests and observations will be conducted by STRATA, Inc. during construction in order to document compliance with our recommendations and to confirm conditions between exploration locations. This acknowledgement is in lieu of all express or implied warranties.

The following plates and appendices accompany and complete this report:

Plate 1:	Site Plan
Plate 2:	Foundation/Wall Drainage Schematic
Appendix A:	Unified Soil Classification System (USCS) Exploratory Boring Logs
Appendix B:	Laboratory Test Results
Appendix C:	Steel Helical Pier Specifications

The information depicted on this map is the result of digital analyses performed on a database consisting of information from a variety of governmental and other credible sources. The accuracy of the information presented is limited to the collective accuracy of the database on the date of the analysis. The information is believed accurate and reasonable efforts have been made to ensure the accuracy of the map. However, the Coeur d'Alene Tribe expressly disclaims responsibility for damages or liability that may arise from use of this map. This product is the property of the Coeur d'Alene Tribe and its use is thereby restricted.
Produced by the Coeur d'Alene Tribe GIS 10/20/2005
/GIS-B1/D/ArcMap/DesmetTensedTrail11X17.mxd

VICINITY MAP
NOT TO SCALE

LEGEND

B-1 Approximate Location of Boring Observed by STRATA on June 17, 2008.

SITE PLAN
Proposed Tensed-DeSmet Pedestrian Bridge
Tensed, Idaho

STRATA
GEOTECHNICAL ENGINEERING & MATERIALS TESTING
Integrity from the Ground Up

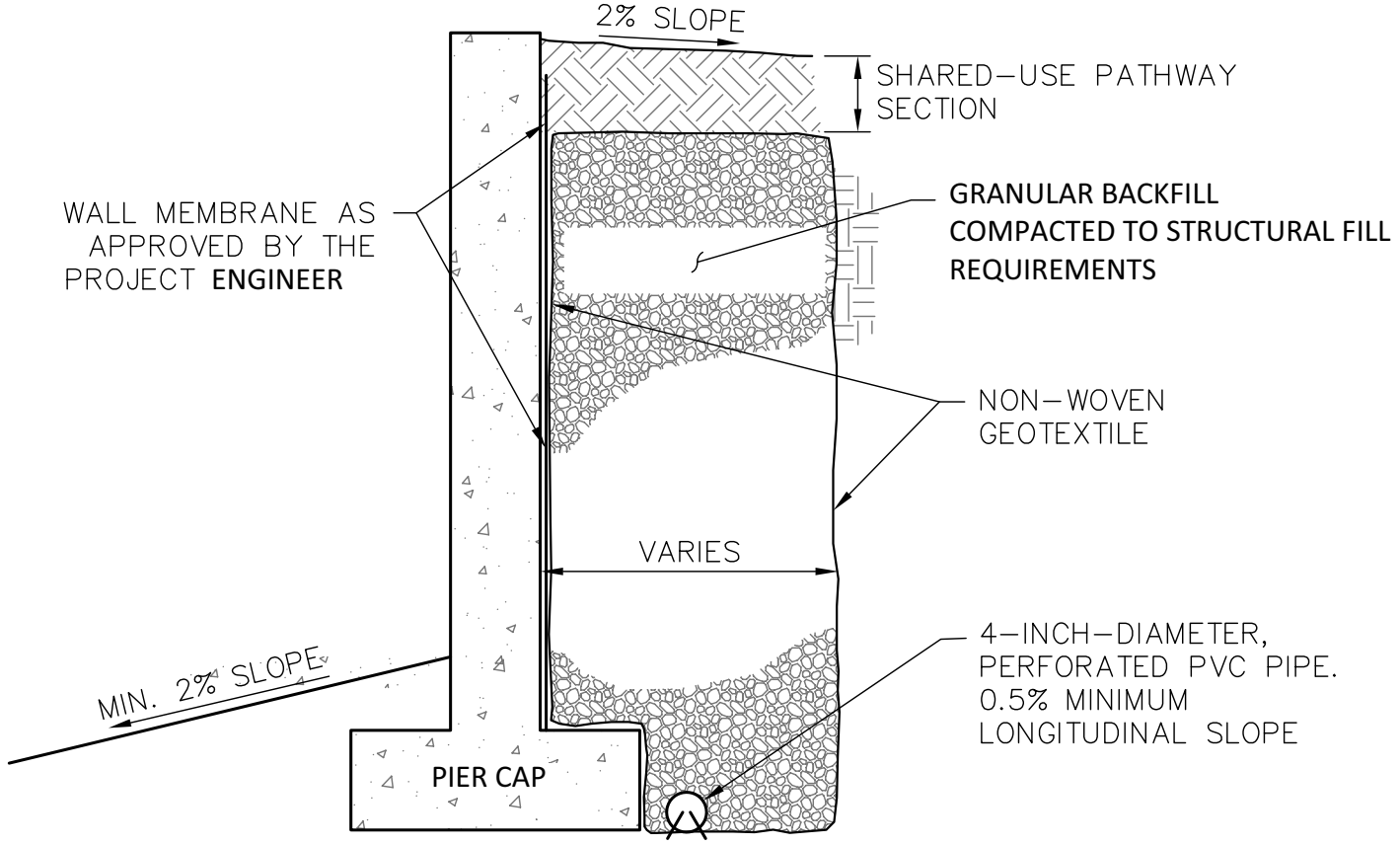
TERGRA M08064A	PLATE: 1

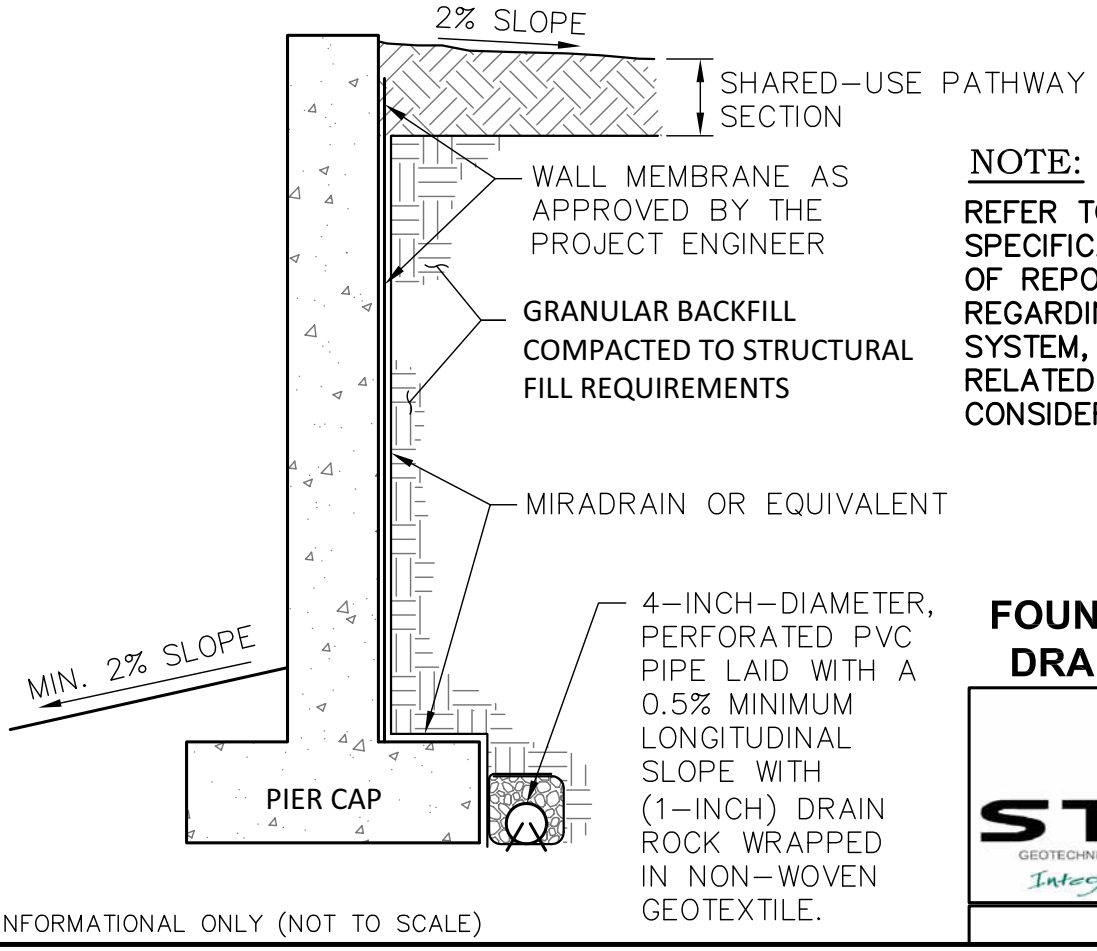
THIS PLAN COMPRISES A PORTION OF STRATA'S GEOTECHNICAL REPORT AND THE TEXT OF THE REPORT CONTAINS ESSENTIAL INFORMATION: BEFORE UTILIZING THIS PLAN FOR ANY PURPOSE WHATSOEVER, THE REPORT SHOULD BE READ COMPLETELY. THIS PLAN IS INTENDED TO INDICATE APPROXIMATE LOCATIONS OF GEOTECHNICAL EXPLORATIONS, TESTS, AND OTHER GEOTECHNICAL ISSUES (REFER TO TEXT FOR INFORMATION ON METHODS, RESULTS, AND SUBSEQUENT CONCLUSIONS AND RECOMMENDATIONS). THESE LOCATIONS AND INFORMATION WERE ADDED TO EXISTING PLANS OF THE SITE PREVIOUSLY PREPARED BY OTHERS AND NO CHECK OF ACCURACY, CURRENCY, APPROPRIATENESS, ETC., OF INFORMATION PROVIDED BY OTHERS WAS PERFORMED, SINCE SUCH CHECKS WERE NOT PART OF STRATA'S WORK SCOPE.

Reference: Site Plan From Terragraphics– Desmet–Tensed Trail Map. pdf, Recieved: 06/04/2008.

NOTE:

THIS DRAWINGS' CROSS-SECTIONS MAY BE USED FOR GRAVITY WALLS. THIS IS NOT A STRUCTURAL DETAIL.





NOTE:

REFER TO MANUFACTURER'S SPECIFICATIONS AND TEXT OF REPORT FOR INFORMATION REGARDING DRAINAGE SYSTEM, WALL DESIGN AND RELATED GEOTECHNICAL CONSIDERATIONS.

INFORMATIONAL ONLY (NOT TO SCALE)

FOUNDATION / WALL DRAIN SCHEMATIC

STRATA
GEOTECHNICAL ENGINEERING & MATERIALS TESTING
Integrity from the Ground Up

PLATE 2

APPENDIX A

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

EXPLORATORY BORING LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS	GRAVELS	CLEAN GRAVELS		GW	Well–Graded Gravel, Gravel–Sand Mixtures.
				GP	Poorly–Graded Gravel, Gravel–Sand Mixtures.
		GRAVELS WITH FINES		GM	Silty Gravel, Gravel–Sand–Silt Mixtures.
				GC	Clayey Gravel, Gravel–Sand–Clay Mixtures.
	SANDS	CLEAN SANDS		SW	Well–Graded Sand, Gravelly Sand.
				SP	Poorly–Graded Sand, Gravelly Sand.
		SANDS WITH FINES		SM	Silty Sand, Sand–Silt Mixtures.
				SC	Clayey Sand, Sand–Clay Mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50%			ML	Inorganic Silt, Sandy or Clayey Silt.
				CL	Inorganic Clay of Low to Medium Plasticity, Sandy or Silty Clay.
				OL	Organic Silt and Clay of Low Plasticity.
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%			MH	Inorganic Silt, Micaceous Silt, Plastic Silt.
				CH	Inorganic Clay of High Plasticity, Fat Clay.
				OH	Organic Clay of Medium to High Plasticity.
				PT	Peat, Muck and Other Highly Organic Soils.

BORING LOG SYMBOLS

- Standard 2–Inch OD Split–Spoon Sample
- California Modified 3–Inch OD Split–Spoon Sample
- Rock Core
- Shelby Tube 3–Inch OD Undisturbed Sample

GROUNDWATER SYMBOLS

- Groundwater After 24 Hours
- (7–3–07) Indicates Date of Reading
- Groundwater at Time of Drilling

TEST PIT LOG SYMBOLS

- BG Baggie Sample
- BK Bulk Sample
- RG Ring Sample

Shorthand Notation:
BGS = Below Existing Ground Surface
N.E. = None Encountered

STRATA
GEOTECHNICAL ENGINEERING & MATERIALS TESTING
Integrity From the Ground Up

USCS Description	DEPTH (In Feet)	USCS CLASS	SYMBOL	SAMPLE Type	SPT Blows Per 6 Inches	SPT N(60)	Dry Density (Pcf)	Moisture Content (%)	POCKET Penetro-meter (tsf)	REMARKS Note: BGS = Below Ground Surface
Topsoil: Silt. Dark brown, soft, moist.	1	ML								Vegetation and organics to about 1.5' BGS.
Alluvium: Silt with Sand. Dark brown to grey with orange mottling, firm, moist to wet.	2 3 4 5 6 7	ML		BK Sample	3 3 5	6				Note: Blow counts corrected for sampler diameter.
Alluvium: Sand with Silt. Light grey, very loose, wet.	9 10 11 12 13 14 15	SP–SM		Sample	3 2 2	3				Note: Blow counts corrected for sampler diameter. No recovery.

Client: TERGRA	Boring Number: B–1	STRATA GEOTECHNICAL ENGINEERING & MATERIALS TESTING Integrity from the Ground Up	EXPLORATORY BORING LOG
Project: M08064A	Date Drilled: 06/17/08		
Drill Rig: 9600 E.C.	Boring Diameter: 8" HSA		
Depth to Groundwater: 8.0'	Logged By: AJA		Sheet 1 of 3

USCS Description	DEPTH (In Feet)	USCS CLASS	SYMBOL	SAMPLE Type	SPT Blows Per 6 Inches	SPT N(60)	Dry Density (Pcf)	Moisture Content (%)	POCKET Penetro-meter (tsf)	REMARKS Note: BGS = Below Ground Surface
Alluvium: Sand with Silt. Light grey, very loose, wet.		SP-SM			4					Note: Trace organics observed, including leaves.
Alluvium: Silt. Dark greenish-grey, stiff to very stiff, moist.	16	ML			6 7	13				
	17									
	18									
	19									
	20				5					
	21				10 12	18				Note: Blow counts corrected for sampler diameter.
	22									
	23									
	24									
	25				5					Solid Stem Power Probe Little Resistance from 25.0-30.0' BGS.
	26				7 12	19				
	27									
	28									
	29									
	30									

Client: TERGRA	Boring Number: B-1	STRATA GEOTECHNICAL ENGINEERING & MATERIALS TESTING Integrity from the Ground Up	EXPLORATORY BORING LOG
Project: M08064A	Date Drilled: 06/17/08		
Drill Rig: 9600 E.C.	Boring Diameter: 8" HSA		
Depth to Groundwater: 8.0'	Logged By: AJA		Sheet 2 of 3

USCS Description	DEPTH (In Feet)	USCS CLASS	SYMBOL	SAMPLE Type	SPT Blows Per 6 Inches	SPT N(60)	Dry Density (Pcf)	Moisture Content (%)	POCKET Penetro-meter (tsf)	REMARKS Note: BGS = Below Ground Surface
Alluvium: Silt. Dark greenish-grey, stiff to very stiff, moist.		ML								Solid Stem Power Probe Moderate Resistance from 30.0-35.0' BGS.
	31									
	32									
	33									
	34									
	35									Solid Stem Power Probe Moderate Resistance from 35.0-40.0' BGS.
	36									
	37									
	38									
	39									
	40									
Boring terminated at about 40.0' BGS. Loosely backfilled upon completion.										
	41									
	42									
	43									
	44									
	45									

Client: TERGRA	Boring Number: B-1	STRATA GEOTECHNICAL ENGINEERING & MATERIALS TESTING Integrity From the Ground Up	EXPLORATORY BORING LOG
Project: M08064A	Date Drilled: 06/17/08		
Drill Rig: 9600 E.C.	Boring Diameter: 8" HSA		
Depth to Groundwater: 8.0'	Logged By: AJA		Sheet 3 of 3

USCS Description	DEPTH (In Feet)	USCS CLASS	SYMBOL	SAMPLE Type	SPT Blows Per 6 Inches	SPT N(60)	Dry Density (Pcf)	Moisture Content (%)	POCKET Penetro-meter (tsf)	REMARKS Note: BGS = Below Ground Surface
Topsoil: Silt. Dark brown, soft, moist.	1	ML								
Alluvium: Silt with Sand. Dark brown to grey with orange mottling, firm, moist to wet.	2 3 4 5 6 7	ML			2 4 4	8				
Alluvium: Silt Gravel with Sand. Dark grey with reddish-brown staining, loose, moist to wet.	8 9 10 11 12 13 14 15	GM			14 21 20	33				Note: Blow counts corrected for sampler diameter. No recovery.

Client: TERGRA	Boring Number: B-2	STRATA GEOTECHNICAL ENGINEERING & MATERIALS TESTING Integrity from the Ground Up	EXPLORATORY BORING LOG
Project: M08064A	Date Drilled: 06/17/08		
Drill Rig: 9600 E.C.	Boring Diameter: 8" HSA		
Depth to Groundwater: 8.0'	Logged By: AJA		Sheet 1 of 3

USCS Description	DEPTH (In Feet)	USCS CLASS	SYMBOL	SAMPLE Type	SPT Blows Per 6 Inches	SPT N(60)	Dry Density (Pcf)	Moisture Content (%)	POCKET Penetro-meter (tsf)	REMARKS Note: BGS = Below Ground Surface
Alluvium: Silt Gravel with Sand. Dark grey with reddish-brown staining, loose, moist to wet.		GM								
Alluvium: Silt. Dark greenish-grey, stiff to very stiff, moist.		ML			1					
	16				2	5				
					3					
	17									
	18									
	19									
	20				4					
	21				6	15				
					9					
	22									
	23									
	24									
	25									Solid Stem Power Probe Little Resistance from 25.0-30.0' BGS.
	26									
	27									
	28									
	29									
	30									

Client: TERGRA	Boring Number: B-2	STRATA GEOTECHNICAL ENGINEERING & MATERIALS TESTING Integrity from the Ground Up	EXPLORATORY BORING LOG
Project: M08064A	Date Drilled: 06/17/08		
Drill Rig: 9600 E.C.	Boring Diameter: 8" HSA		
Depth to Groundwater: 8.0'	Logged By: AJA		Sheet 2 of 3

USCS Description	DEPTH (In Feet)	USCS CLASS	SYMBOL	SAMPLE Type	SPT Blows Per 6 Inches	SPT N(60)	Dry Density (Pcf)	Moisture Content (%)	POCKET Penetro-meter (tsf)	REMARKS Note: BGS = Below Ground Surface
Alluvium: Silt. Dark greenish-grey, stiff to very stiff, moist.	30	ML								Solid Stem Power Probe Moderate Resistance from 30.0-35.0' BGS.
	31									
	32									
	33									
	34									
	35									Solid Stem Power Probe Moderate Resistance from 35.0-40.0' BGS.
	36									
	37									
	38									
	39									
	40									
Boring terminated at about 40.0' BGS. Loosely backfilled upon completion.	41									
	42									
	43									
	44									
	45									

Client: TERGRA	Boring Number: B-2	STRATA GEOTECHNICAL ENGINEERING & MATERIALS TESTING Integrity from the Ground Up	EXPLORATORY BORING LOG
Project: M08064A	Date Drilled: 06/17/08		
Drill Rig: 9600 E.C.	Boring Diameter: 8" HSA		
Depth to Groundwater: 8.0'	Logged By: AJA		Sheet 3 of 3

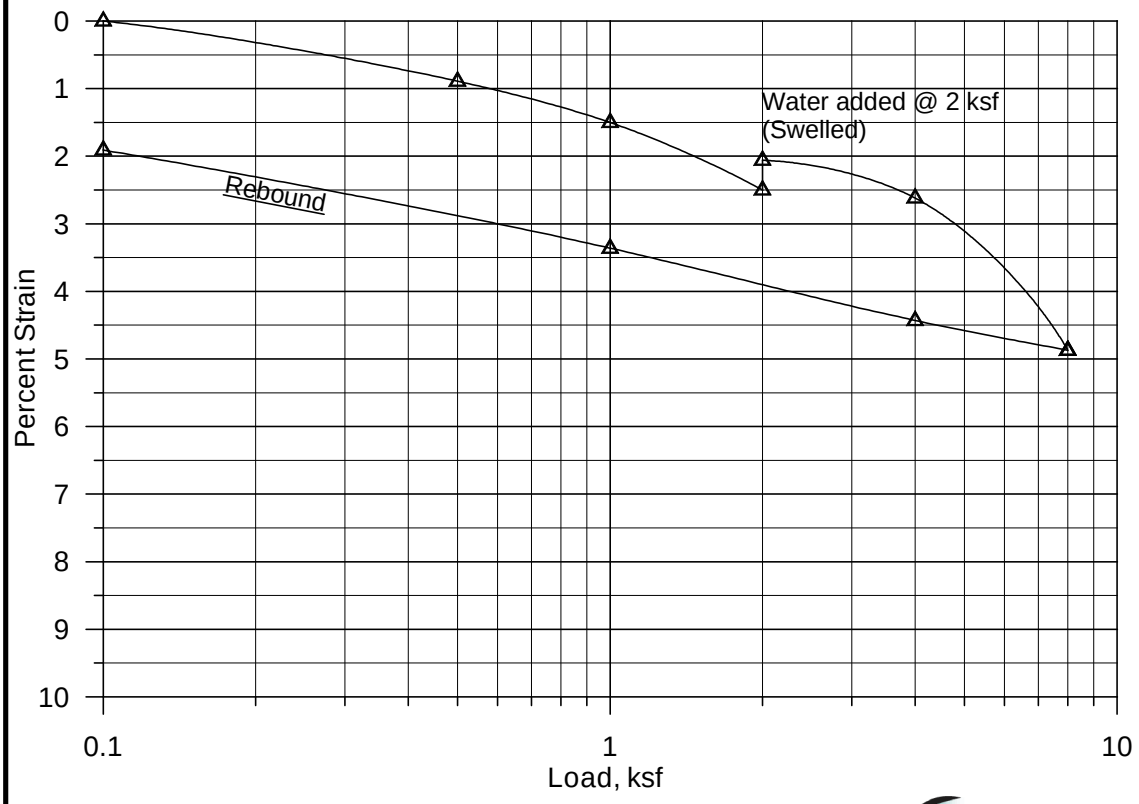
APPENDIX B

LABORATORY TEST RESULTS

CONSOLIDATION TEST RESULTS

ASTM D-2435

Project: Tensed-Desmet Trail
Client: Terragraphics
File Name: TERGRA M08064A
Date Tested: 7/1/08 By: AM
Sample Number: B8L1265
Sample Location: B-1 @ 20 - 21.5'
Sample Description: Elastic/Organic Silt (Volcanic Ash?)
Initial Test Conditions: In Situ
Moisture Content: 170.5%
Dry Unit Weight: 29.8 pcf
Atterberg Limits: LL = 137, PI = 30 (MH/OH)
Organic Content = 9.9%



Reviewed By _____

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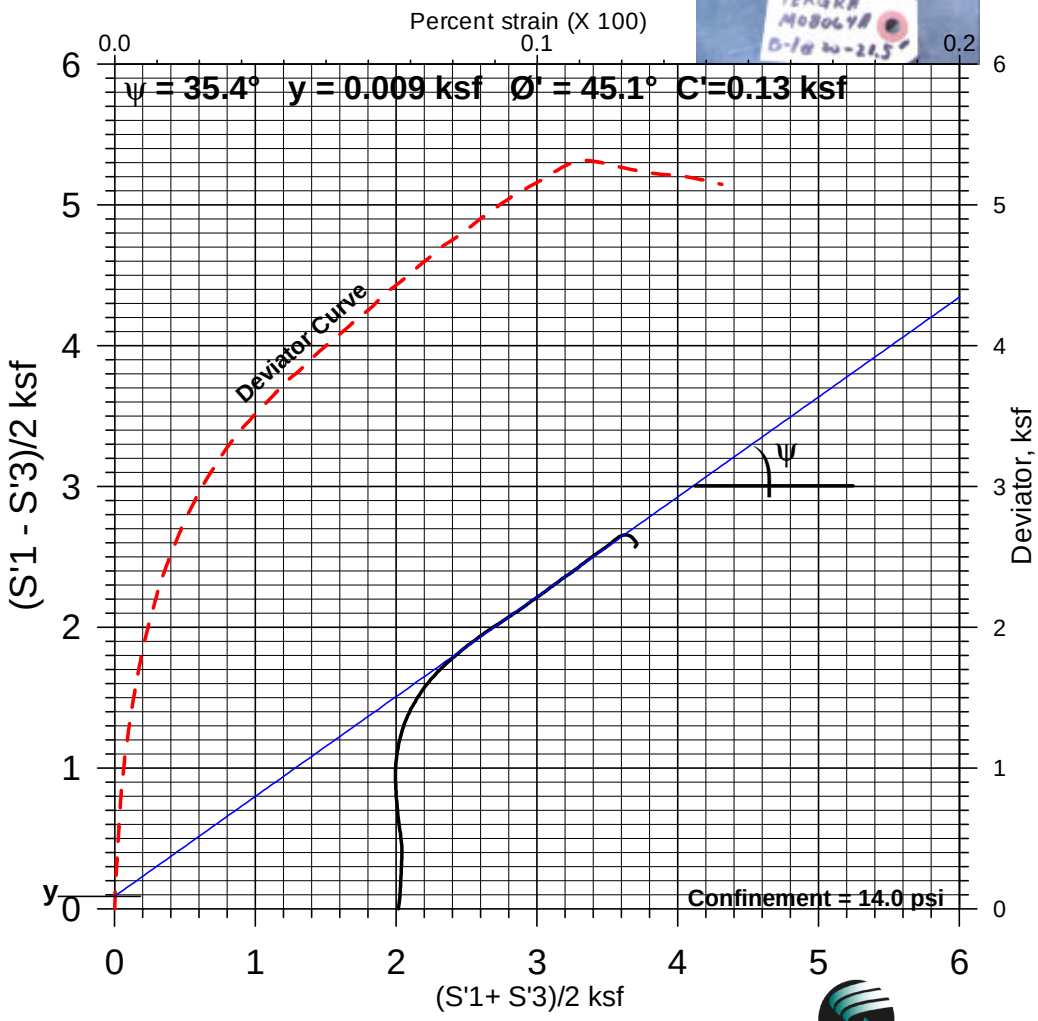
Integrity from the Ground Up

STRESS PATH
ASTM D4767 CU

Project: Tensed-Desmet Trail
Client: Terragraphics
File No.: TERGRA M08064A
Sample: In Situ Ring (condition: Good)
Location: B-1 @ 20 - 21.5'
Dry Density: 29.8 pcf @ 170.5% moisture content
Soil Type: Elastic/Organic Silt (Volcanic Ash?)
Sample No.: B8L1265 Tested: 7/1/08 By: AM
Atterberg Limits: LL = 137, PI = 30 (MH/OH)
Organic Content = 9.9%



Reviewed by: Adrian Clasons

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MOISTURE-DENSITY RELATIONSHIP CURVE

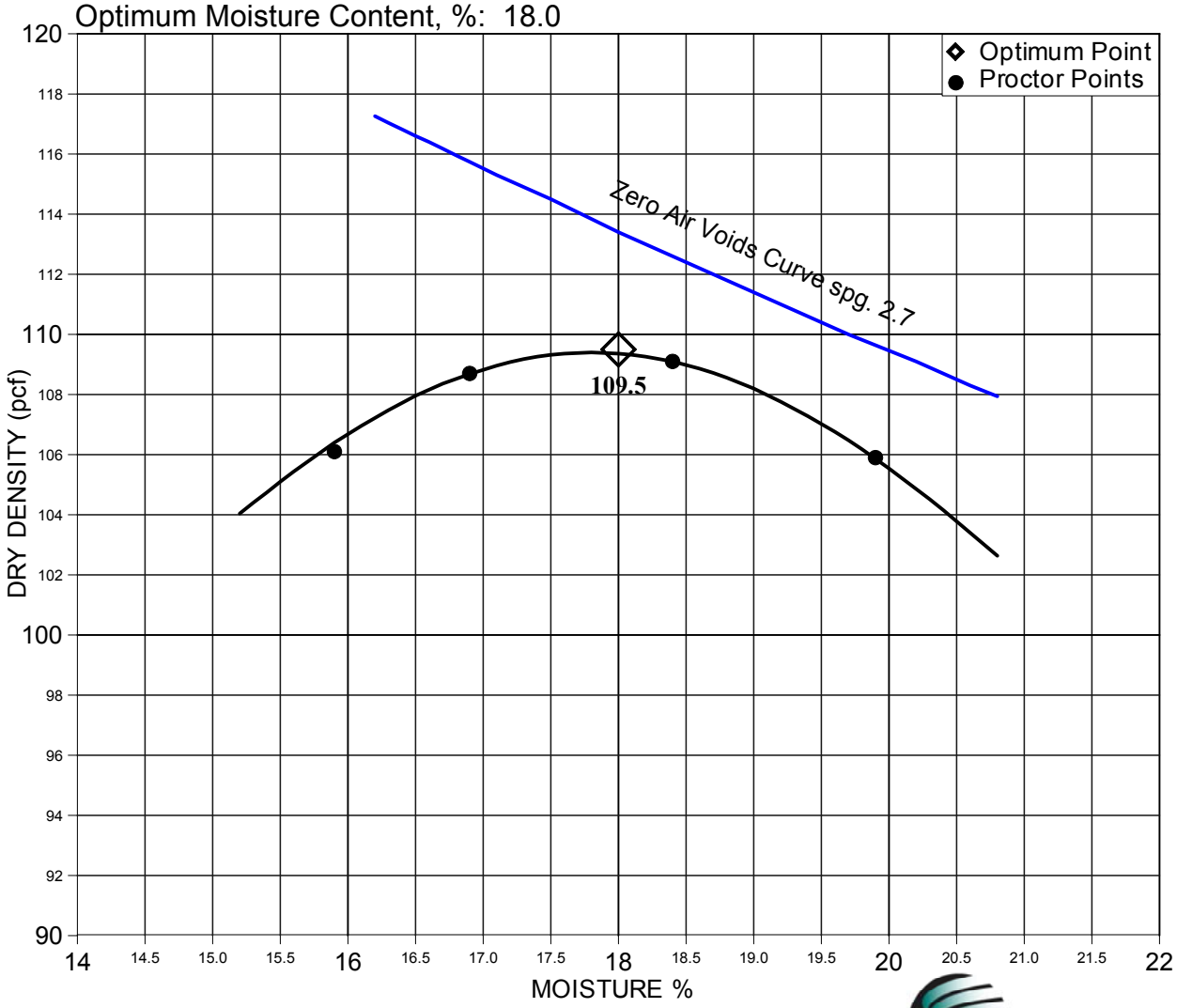
ASTM D-1557
Method A

Project: Tendes Desmet Predestrian Path
Client: TERGRA
File Name: M08064A
Date Tested: 07/24/08
Tested By: HDC
Sample Number: M08066B
Sample Location: B-1 @ 1.5-2.5
Sample Description: Tan silty clay
Rammer Type: Mechanical

GRADING ANALYSIS

SCREEN SIZE	% PASSING	AS TESTED
#4 screen	100	100

Maximum Dry Density, pcf : 109.5
Optimum Moisture Content, %: 18.0



Reviewed By Andy Abre

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Integrity From the Ground Up

APPENDIX C

STEEL HELICAL PIER SPECIFICATIONS

STEEL HELICAL PIER SPECIFICATIONS

PART 1) - GENERAL

a)SUMMARY

Includes the installation of helical piers in the locations shown on the plans to a minimum ultimate strength in compression of 50 kips. An allowable or operating capacity of 16 kips resulting in a factor of safety of 3.0 shall be provided and verified through torque and load testing.

i)Base Bid: The Base Bid shall include 6 completely installed steel helical piers to the length necessary to achieve the required capacity as measured from top or cutoff elevation to bottom of shaft. Piers are estimated at a 50 foot length and must include all necessary equipment and additional piers to accomplish at least 1 load test.

ii)Unit Price - Basis for Payment: One of the following methods shall be used for payment of the installation of helical piers.

(1) Piers installed to a 50 foot depth plus or minus unit prices per shaft extension measured in 3, 5 or 7 foot increments and including a load test.

(2) Lump Sum for the installation, load testing and verification to achieve the desired capacity as specified on the plans.

b)SUBMITTALS

i)Product Data: For each type of product indicated including manufacturer's acknowledgment of the application and loading of helical anchor products and that the contractor is an approved installer.

ii)Installer Qualifications: Submit as listed in Quality Assurance.

iii)Shop Drawings: Indicating specific shaft and helix sizes or the estimated pier configuration to achieve capacity, and include manufacturer's catalog cuts and data sheets. Also include anticipated pier configuration adjustments where soil is too stiff to achieve minimum depth or too soft to achieve capacity.

iv)Welding certificates.

v)Record drawings at Project closeout according to Division 1 Section "Closeout Procedures."

c)QUALITY ASSURANCE

i)Installer Qualifications: Installation shall be done by a steel helical pier manufacturer's (A.B. Chance) authorized installation contractor. Proof of current certification with the steel helical pier manufacturer shall be submitted to the architect during the submittals period.

ii)A representative of the Geotechnical Engineer of Record (STRATA) shall be present during installation of the helical piers

iii)Welding: Meet requirements of AWS "Structural Welding Code," D1.1, latest edition. All welders shall be AWS certified.

iv)Steel Helical Piers as specified shall be manufactured by a facility whose quality control systems comply with ISO (International Organization of Standard) 9001 requirements.

Certificates of Registration denoting ISO Standards Number shall be presented upon request to the owner or their representative.

v)Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for drilled piers. Before excavating, lay out each drilled pier to lines and levels required. Record actual measurements of each drilled pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.

(1)Record and maintain information pertinent to each drilled pier and cooperate with STRATA to provide data for required reports.

vi) Preinstallation Meeting: Schedule and conduct conference prior to installing piers at Project site. Representatives from Coeur d'Alene Tribe (Owner), TerraGraphics and STRATA must be notified of the meeting 48 hours in advance.

d)PROJECT CONDITIONS

i)Existing Utilities: Locate existing underground utilities before installation of helical piers. If utilities are to remain in place, provide protection from damage during helical pier installation.

(1)Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with Owner and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility owner.

ii)Site Information: A geotechnical report has been prepared by STRATA for this Project, dated August 22, 2008 and is included elsewhere in the Project Manual and shall be used as a guide for this work.

PART 2) - PRODUCTS

a)MANUFACTURERS

i)In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

(1)Basis-of-Design Product: The design for steel helical piers specified is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by another manufacturer which must be submitted for approval prior to the bid.

b)STEEL HELICAL PIERS

i)General: The steel helical pier system shall be ICC listed. The contractor shall furnish evidence to the Structural and Geotechnical Engineers by means of the ICC evaluation report number ER-5110.

ii)Steel Helical Piers:

(1)Basis of Design Product: Shall be SS-5-Type helical piers as manufactured by A.B. Chance, 210 North Allen Street, Centralia, MO 65240, or a comparable

product which must be submitted to TerraGraphics for review and approval at least 10 days prior to the Bid Opening and listed as approved by Addendum.

(2)Shafts shall be 1.5 inch round cornered square (RCS) solid steel shafts and shall conform to the general requirements of ASTM A29 and the following descriptions:

(a)High strength low alloy (HSLA), low to medium carbon steel grade (similar to AISI 1530) with improved strength due to fine grain size and structure having a torsional strength rating of 10,000 ft.-lbs.

(3)Helices shall be a minimum of 8-inch diameter. Helices shall be carbon steel sheet, strip, or plate formed on matching metal dies to true helical shape and shall conform to ASTM A715 Grade 80.

(4)Bolts used to connect the helical pier extensions to lead sections or another extension shall conform to ASTM A193 Grade B7.

(5)Couplings shall be formed as an integral part of shaft extension material through a forging process.

(6)Finish: All material shall have a Class B-1 hot dipped galvanized coating complying with ASTM A153.

(7)All piers shall consist of new components.

iii)Steel Helical Piers shall be shall extend to sufficient depth to achieve the design operating load and associated required torque by drilling with a minimum down force of 2000 pounds. Pier refusal shall be determined when less than one vertical inch of anchor head movement occurs in 5 minutes of consistent drilling. Continuous torque measurements are required.

c)STEEL CASINGS

i)Steel N/A

PART 3) - EXECUTION

a)PREPARATION

i)Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by drilled-pier operations.

b)EQUIPMENT

i)Installation Equipment:

(1)Shall be a rotary type motor with equal forward and reverse torque capabilities. This equipment shall be capable of continual adjustment of the torque drive unit's revolutions per minute (RPM's) during installation. Percussion drilling equipment will not be allowed.

(2)Shall be capable of applying installation torque equal to the torque required to meet the pier loads.

(3)Equipment shall be capable of applying down pressure and torque simultaneously.

ii)Torque Monitoring Devices:

(1)The torque being applied by the installing units shall be monitored throughout the installation by the installer. The torque monitoring device shall either be a part of the installing unit or an independent device in-line with the installing unit. Calibration for either unit

shall be available for review by the owner. Hydraulic gauges may utilized by the contractor to measure torque providing at least 1 shear pin torque measurement correlation is accomplished for each pier installed.

iii) Testing equipment

(1) The necessary beams, additional piers, jacking device and dial gauges necessary to provide at least 1 load test must be provided by the pier contractor.

c)INSTALLATION PROCEDURES:

i)Advancing Sections:

(1)Engage and advance the Helical Pier sections in a smooth, continuous manner with the rate of pier rotation in the range of 5 to 20 RPM.

(2)Apply sufficient down pressure to uniformly advance the helical sections to approximately 3-inches per revolution. The rate of rotation and magnitude of down pressure must be adjusted for different soil conditions and depths in order to maintain the penetration rate.

ii)Termination Criteria:

(1)The torque as measured during the installation shall not exceed the torsional strength rating of the steel helical lead and extension sections.

(2)The minimum depth criteria of 50 feet must be satisfied prior to terminating the steel Helical Pier due to vertical refusal or as determined by STRATA

(3)If the torsional strength rating of the pier and/or installing unit has been reached prior to satisfying the minimum depth required, the installing contractor shall have the following options:

(a)Terminate the installation at the depth obtained with the approval of the Geotechnical Engineer of Record and install additional piers at no additional cost to the owner.

(b) remove the pier and attempt to reinstall to beyond the minimum depth criteria.

(4)In the event the minimum installation torque is not achieved at minimum depth, the Contractor shall alter the helix configuration or depth to achieve the required capacity.

(5)The average torque for the last 3 feet of penetration shall be used as a basis of comparison with the minimum recommended installation torque. The average torque is the average of the last three readings recorded at one foot intervals. This average torque is intended solely as an indication of the pier's ultimate compression capacity.

iii) Documentation

The installer shall keep a written installation record for each Helical Pier. This record shall include the following information :

(a)Project name and location.

(b)Name of authorized and certified dealer and installer.

(c)Name of installer’s foreman or representative witnessing the installation.

(d)Date of installation.

(e)Location drawing of each Helical Pier.

(f)Description of lead section including number and diameter of helices and extensions used.

(g)Overall depth of installation from a known reference point.

(h)Installation torque at termination of pier.

d)PERMANENT STEEL CASINGS

i) When necessary by design for soft soil, steel pipe casing shall be provided and consist of Schedule 40 steel pipe sized to just go over the coupler sections

(1)Install casings as excavation proceeds, to maintain sidewall stability.

(2)The steel pipe casing shall be pushed pneumatically into the soil profile around the helical piers until refusal at least 10 feet.

(3)Connect casing sections by continuous penetration welds to form watertight, continuous casing.

(4)Remove and replace, or repair, casings that have been damaged during installation and that could impair strength or efficiency of drilled pier.

e)FIELD QUALITY CONTROL

i)Testing Agency: The helical pier system is a critical component of foundation support. Therefore, STRATA shall be retained to sample materials, perform tests, and submit reports during installation of helical piers.

ii)A helical pier report will be prepared by the Geotechnical Engineer of Record for each drilled pier as follows:

(1)Actual top and bottom elevations.

(2)Estimated top of rock elevation.

(3)Description, location, and dimensions of obstructions.

(4)Final top centerline location and deviations from requirements.

(5)Variation of shaft from plumb.

(6)Design and tested bearing capacity of bottom.

(7)Description, diameter, and top and bottom elevations of permanent casings.

(8)Inspection report.

(9)Remarks, unusual conditions encountered, and deviations from requirements.

C. Load test one pier 24 or more hours after installation. Load tests shall be observed by the Geotechnical Engineer of Record.

1. Piers shall be loaded in 25 % increments of the allowable design load to 150% of design in accordance with Table 1 below.
2. The piers selected shall not be a retrofitted piers or a pier that will be utilized for the support of existing foundations.
3. Testing equipment shall have been calibrated within 6 months of installation and capable of holding the test load without bleed off for at least 1 hour.
4. An acceptable test results when vertical movement of the pier results in less than 0.25 inches between one log cycle (6 to 60 minutes) under the test load.
5. Failing piers shall be corrected prior to continuing remaining pier installation.
6. If a failing test results, all anchors shall be tested.
7. The following table outlines the minimum data to be obtained during installation, including load and time increments:

Table 1- Anchor Load Information

Load Increment	Hold Time (min)	Time of Reading
0.00DL	0	None
0.25DL	5	5
0.50DL	5	5
0.75DL	5	5
1.00DL	5	5
1.25DL	5	5
1.50DL	60	1
		2
		3
		4
		5
		6
		10
		20
		30
		40
		50
		60

END OF SECTION